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A. S. BURLESON,
Postmaster General.

TELEPHONE ENGINEER

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Not only are the basic principles underlying Automatic Telephone operation correct. Not alone does this equipment offer the only fundamentally sound and complete solution of the problems of giving telephone service.

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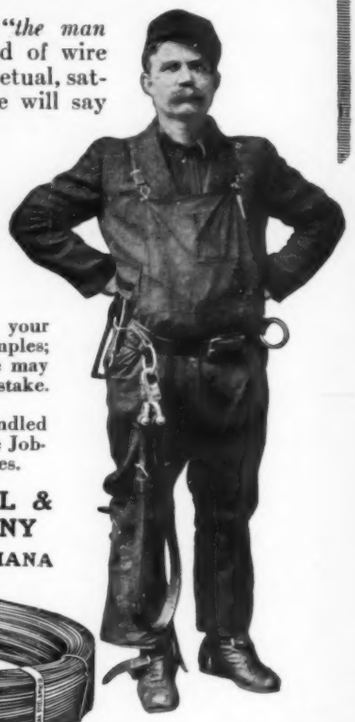

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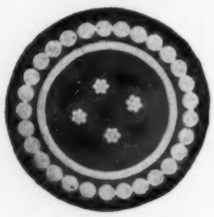

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VOL. XX CHICAGO, DECEMBER, 1918 NO. 6

Peace---And Now to Business!

THE conclusion of a practical world peace, if not its theoretical completion, opens the gate to a vast accumulation of work and an even vaster amount of speculation and conjecture. Will the government attempt to turn control into ownership? If not, will it aim at least to continue its war-time length and breadth of supervision? If it relinquishes control and returns all the telephone properties to private ownership, will the effect of changes already accomplished and those of the immediate future so confuse the rights of property that the eggs thrown freely into the administration's pan cannot be wholly unscrambled?

The bill introduced by Senator Lewis of Illinois providing for government ownership and operation of utilities is too comprehensive, in the opinion of well-informed men, to stand much chance of passage. Nevertheless, it is an indication of the kind of proposals to which our legislators must give ear for some time to come. For, in spite of the loose newspaper talk of federalization's sequel, even the farm-line operator knows there can be no perpetuation of government control without new legislation, upon which the act empowering present procedure has no bearing whatever.

Furthermore, since the war emergency no longer exists, the impelling motive behind legislation for permanent government ownership of wire communications has behind it no more logic or force than it had before the war started. The sole problem of the situation is whether our lawmakers are so well pleased with the administration's experiment in control that they will give it a quit claim deed to the whole property, business and good will of the telephone industry. Without any wish to attempt prophecy, we feel that present indications are for a return of all public utilities, in due time, to their former owners and operators. The fact that Director General of Railroads McAdoo, as well as other prominent figures in the present administration, has declared against government interference in the business of utility operating does not weaken this belief. The support of government ownership, while strong, still will be in the minority, we believe.

So far, the Post Office management of telephones has contrived to institute a number of significant changes in commercial practice without occasioning any harm to the operating industry. It seems probable, indeed, that the new arrangements sanctioned by the government, and put into effect by virtue of its unquestioned authority, will result in permanent good. We are speaking, of course, strictly of the telephone business and not of the telegraph.

Most significant of peace regained is the removal of restrictions on construction and installation. Because the demand has kept on growing at the normal rate while the supply was held stationary, there is now a great accumulation of installation orders to satisfy. The telephone manufacturing and supply business should be extraordinarily good for a long time.

The Postmaster General's Bulletin 13 of November 18, while it does not, as has been reported, "throw open long distance facilities to any company desiring toll connections," does make possible the reasonable extension of toll facilities to some companies which have not hitherto enjoyed that privilege. This is perhaps the most highly important development of practice that will come out of government control. It puts into practical operation the system of universal physical connection; a plan which TELEPHONE ENGINEER was the first to

propose, in the face of much opposition, several years ago. This paper's stand on the subject, in the words of President E. B. Fisher, first "crystallized the action of the Independent association" in support of compulsory physical connection, which Independents previously had fought on the suspicion that it was a Bell measure. That the suspicion was groundless, as we had asserted, was proven by the continuous Bell resistance to all attempts to put the system into practice, by legislation or agreement. So the government order solves that problem, presumably for all time.

It has been contended that the administration's telephone activities are guided by Bell experts, of which assertion much has been made by municipal figures who wished to resist the upward tendency of rates. Nevertheless, we have no evidence that the Independent operators have suffered, or will suffer, any special loss or embarrassment by government order. The Post Office department has displayed, so far, a high degree of consideration and co-operative spirit toward both Independent and Bell, with no evident disadvantage to either.

When the telephones are returned to their owners—as we have the utmost confidence they will be—we believe Independent telephony will be stronger, better equipped, and in the enjoyment of more privileges and more security than has been its lot for many years.

Strikes on Government-Controlled Properties

PROBABLY the most remarkable demonstration of the last month, during which the public awoke for the first time to the fact of government control of wires, has been labor's epidemic of strike fever. Anyone who conjectured that governmental operation would end labor trouble has been disappointed.

Postmaster General Burleson has been called autocratic by those who would run things differently. We dare say there have been moments in the last thirty days when public utility operators have blessed the "autocracy" of that curt notification which said that no striking employee remaining out more than twenty-four hours should be reinstated.

Every thinking man feels concern for the welfare of those employees whose living expenses have inexorably risen while their wages were held stationary by the iron bonds of circumstance. But to disregard the logic of that circumstance; to insist upon impossible decisions and the exercise of authority which does not exist; to make a futile display of useless and abortive power by resort to the medieval strike weapon, which works its greatest harm upon the strikers themselves and the innocent public; that is what tempts to the exercise of the very autocracy it aims to discourage.

It is apparent that government control, already exercised upon a majority of our public utilities, should be extended to cover the operations of those professional agitators, those miniature Trotzkys who style themselves "labor leaders." The several strikes of telephone employees called in November illustrate well the fact that the prime movers in labor activity are usually unhampered by any knowledge, or any desire for knowledge, of the situation in which they so boldly assert themselves. The sequel should occasion no surprise; for it can hardly be expected that switchboard operators, linemen and the general run of skilled manual labor which makes up the union clientele should know anything whatever about corporation finances, rate causes and relations, or the thousand complications that limit utility prosperity.

If, therefore, we feel any resentment against those who use the strike weapon, it should be directed toward the agitators whose plausible sophistry so readily influences their uninformed audiences. Ignorance of the law excuses nobody; but out of court our judgments must be, and are, affected by the circumstances of motive. We are inclined to forgive employees their belief that operating profits are large, when we recall their ignorance of economics and appreciate the pressure of assurance thrust upon them in the specious eloquence and aggressive persuasion of self-appointed "leaders," whose leadership is accepted because it is emotionally convincing.

The full weight of moral responsibility for the uneasiness of telephone operating employees rests upon the slippery shoulders of agitators who know nothing of public utility conditions and care nothing for their accountability to the public. So long as telephone employees are government employees the remedy should not be difficult.

Invest at least one-tenth of your December income in War Savings Stamps!

The Red Cross maintains in New York at 311 Fourth avenue the Red Cross Institute for Crippled and Disabled Men, the head of which is Dr. Douglas C. McMurtrie, a pioneer of this new attitude of society's duty toward a disabled man. At the school six model courses are given to refit crippled men for their old or new trades. Manufacture of artificial limbs; oxyacetylene welding; mechanical drafting, printing, motion picture operating and jewelry work. The Walter Read Hospital in Washington has the finely equipped new buildings known as curative workships. Here are classes in motor mechanics, very popular, use of the left arm and hand instead of the right, classes in English and French, in shorthand and typewriting for cases of amputation of legs, telegraphy, rug weaving, artificial limb making, carpentry, agriculture and farming. The men who have lost arm or leg, or have been otherwise disabled, are talked to by experts who try to guide them to refitting themselves for usefulness. No longer will the responsibility of army or government or industry cease by merely pensioning a man. He must, and will, be refitted to retake perhaps even a better place in the community than he had occupied before his injury.

The work accomplished by the American Red Cross and other relief organizations in preventing and controlling the Spanish influenza epidemic stands out with striking force, now that the receding of the wave gives us an opportunity to review the situation and analyze more or less complete reports that are coming in. It was the belief of the Department of Nursing of the American Red Cross that with the organization we had built up, and the enrollment not only of nurses for military service, but Home Defense as well, we should be able to mobilize our resources and render efficient service in a national emergency. The epidemic, appearing at so critical a time, became a supreme test of the flexibility and efficiency of the Red Cross Nursing Service. In the picture, the making of influenza masks in a Red Cros workshop is shown.

If you telephone to your local Red Cross Christmas Roll Call Committee, they will provide you with the necessary subscription blanks for the number of employes you have. After getting the blanks you can then canvass either personally or through appointed deputies every man and woman in your employ. Make your establishment a one hundred per cent. shop by getting a membership and fee from everyone.

Subscriptions and proceeds should be turned over at once to your local Red Cross chapter. DON'T WAIT. ACT NOW!

TWISTING TELEPHONE WIRES AT THE FRONT

An ingenious method of twisting telephone wires into cables at the front, rigged up by the Canadians.

Necessity has once more demonstrated her right to the title "The Mother of Invention." When a man has no tools at hand, he must, like the Swiss Family Robinson, make them, utilizing simple things that come to hand. So it is at the front in France. Needs arise daily, and are filled. If a man lacks a certain tool, he substitutes another, modifying it to suit his purpose. An interesting case in point is a scheme worked out by the Canadians for twisting telephone wires at the front. Motive power is furnished by a rear wheel of a motor truck for the turning of the wheel device, as illustrated in the center of the accompanying photograph. This, in turn, sets the two spools suspended from each large wheel to revolving. These spools are so arranged that their revolutions twist up the single strands into a two-ply cable, which, passing through an opening in the post, is then rolled up on the reel truck to either side.—New York Telephone Company's "Telephone Review."

Dallas Merger to Proceed

The cessation of hostilities and the consequent government removal of restrictions on material and transportation facilities will considerably accelerate the physical merging of the telephone properties of Dallas, Tex., in the opinion of J. C. Casler, vice president of the new Dallas Telephone Company, and J. E. Farnsworth, one of the directors.

"The work of connecting up the two systems will proceed rapidly after a short time," Mr. Casler said. "Materials are now obtainable, labor is more plentiful and transportation facilities have been improved, all of which will aid the merging project. I feel safe in saying that the citizens of Dallas will be using only one telephone by the time the next year is out."

The companies will have to get the approval of Postmaster General A. S. Burleson, supervisor of Government control of telegraph and telephone lines, before the work of combining the properties can be carried forward.

Mr. Casler, together with Clarence Linz, went to Washington, to confer with Mr. Burleson in regard to the matter. Mr. Casler has no doubt that approval will be readily forthcoming.

"The signing of the armistice will speed up the work of consolidation, but we can do nothing until the Government says the word," Mr. Farnsworth said. "It is my opinion that the merger can not be effected by the time named in the franchise, which is April 1, 1919."

Burleson Would Lower Rates

The federal wire administration hopes to be able to reduce telephone and telegraph rates, Postmaster General Burleson told the National Association of Railway and Utility Commissioners in convention at Washington November 14.

"Our purpose," he said, "is to unify and consolidate systems, adjust conditions so as to be able to take care of the volume of business. When that has been done we honestly hope to amend rates so as to bring about substantial reductions, which would increase the volume of business and justify extensions."

Mr. Burleson asked for the co-operation and assistance of state commissions and said he planned to add some of their representatives to his rate advisory commissions.

The association elected Charles E. Elmquist, of Minnesota, president; Charles M. Candler, of Georgia, and James B. Eastman, of Massachusetts, vice-president, and J. B. Walker, of New York, secretary.

Union-Bell Merger in Michigan

It was announced by William A. Bahlke, a director and attorney for the Union Telephone Company, at Alma, Mich., that all arrangements had been made for the merger of the Union and Bell interests through that section of the state, and that the merger would take place January 1, 1919.

Mr. Bahlke stated that the concerns had recently secured the permission of the United States department of justice and of the U. S. postoffice department, to put through the merger. The permission of the state railroad commission was also secured, it was stated, which opens a clear way for the two companies to merge their interests.

The proposed merger has been under consideration for some time, and active work in this regard was started over a year ago, but to make the merger possible, the concerns have been forced to fight temporary injunctions and every other means which could be brought to bear. The Valley Telephone Company of Saginaw fought the proposed merger the hardest, securing a temporary injunction some months ago. It failed, however, to secure a permanent injunction to restrain the companies from the proposed merger.

Great Peace Conference

There are assembling at Atlantic City, December 4, 5 and 6, all members of the country's more than 300 industrial war service committees for a great war emergency and reconstruction conference as announced by the War Service Executive Committee of the Chamber of Commerce of the United States.

The meeting will bring together from 2,000 to 3,000 industrial leaders to discuss problems that have arisen with the war's end. National councilors of the chamber, representing the more than 1,100 commercial and industrial organizations which comprise its membership, will meet at the same time and place.

The main purpose of the conferences will be the determination of practical methods whereby industry may cooperate still more closely with the government through a more centralized scheme of organization. This probably can be accomplished best by the creation of a federation of all the war service committees. Questions of reconstruction will be taken up, and representatives of various lines of business will offer their suggestions for the best plan of handling the problems of return to peace.

Inter-State Merger at Last

Definite steps toward the merger of the Central Union Telephone Company and the Inter-State Telephone Company in Illinois have been taken, following years of discussion over the question, according to C. H. Rottger, general manager in Illinois for the Central Union Company, who announced that representatives of both concerns would meet in Chicago to put a value on the Inter-State company's equipment.

Approval of the Illinois public utilities commission and Postmaster General Burleson, he stated, would be forthcoming.

Mr. Rottger said similar negotiations were on foot between the Chicago Telephone Company and the Inter-State company for the purchase of properties of the latter in northern and northeastern Illinois.

Head offices of the Interstate company are located at Aurora, Ill.

Telephone, Haiti to Dominican Republic

The telephone systems of Haiti and the Dominican Republic have recently been connected. It is now possible to communicate between the principal towns of the two republics.

Telephone messages are written out in this country the same as telegrams in the United States. They are then transmitted by the telephone operator. There is no exchange telephone service between the various towns of this republic.

The rates to Haiti are 20 cents a word from the southern section, and 25 cents from the northern provinces of the Dominican Republic. The address and signature are charged for additional.

Scoring Telephone Exchanges on Condition

A Practical Method of Standardizing Service on the Basis of Condition of Plant

By H. N. FARIS

CLASSIFICATIONS

- MAGNETO
  - Metallic Lines.
  - Mixed Lines.
  - Grounded Lines.
- COMMON BATTERY
  - Automatic Listening and Ringing, Flash Recall on Answering Cord.
  - Manual Listening and Ringing, Automatic Recall.
  - Manual Listening and Ringing, no Automatic Recall.
  - Manual Listening and Ringing, Universal Cord Circuits.
  - Manual Listening and Ringing, Combination Cord Circuits.
  - Manual Listening and Ringing, Universal Cord Circuits and Universal Lamp Signal Line Circuits.
- SPECIAL
  - Common Battery Calling but Local Battery Talking.
  - Local Battery Calling and Local Battery Talking.
  - Semi-Automatic with Machine Switching Controlled by Operator.
  - Full Automatic with Machine Switching Controlled by Subscriber.

DEFINITIONS

"MAGNETO," as herein used, denotes all systems in which the subscriber calls the central office and gives, or may give, disconnect or recall signals by operating a hand-power magneto generator.

The terms **"Generator Call"** and **"Local Battery"** are frequently used to designate the **"Magneto"** system. The term **"Generator Call"** is fully descriptive and synonomous with **"Magneto"** or **"Magneto Call,"** but the term **"Local Battery"** is not fully descriptive and should not be used for the reason that **"Local Battery Talking"** systems, although usually **Magneto Calling,** may in special cases, be common battery calling without the use of a magneto, whereas, **"Magneto"** systems are always **Local Battery Talking.**

"COMMON BATTERY," as herein used, denotes all systems in which the subscriber calls the central offie automatically by the mere removal of the receiver from its hook-switch, gives the disconnect signal by its replacal, and in which a single storage battery, or a duplicate set of storage batteries, at the Central Office, supplies current to all subscribers, both for talking and signaling purposes. The terms **"Central Battery"** and **"Central Energy"** are both frequently used to designate this system and both terms are precisely synonomous with the term **"Common Battery"** which denotes that the Central Office storage battery is **"Common"** to the entire exchange.

"SPECIAL" classes are as described. **"Common Battery Calling but Local Battery Talking"** was quite general practice 15 or 20 years ago and some of the plants then installed have not yet been discarded.

"Local Battery Calling and Talking" was likewise used to a limited extent in the early days. Such early installations have long since been abandoned but the system is mentioned here because of recent attempts on the part of some manufacturers to revive it.

"Semi-Automatic" systems, "with machine switching controlled by the operator" have come only in limited use so that of the four "special" systems herein mentioned, the only one that has come into extensive use is the so-called:

"Full Automatic" system, "with machine switching controlled by the subscriber."

THIS paper will be confined to detail directions for the scoring of "Magneto" telephone exchanges. The large number of such plants, comprising more than 90 per cent of the total exchanges in the United States, together with the fact that plants of this type vary in quality much more than do "Common Battery" plants, means that in the "Magneto" exchange we are tackling the most difficult scoring problem. The "common battery" and "special" exchanges are so few in number by comparison that high class engineering talent will be found available for passing on their condition, but in the case of the "magneto" plants we must formulate such rules of procedure as will enable any person of fair telephone knowledge and good common sense to accurately score such plants without being thoroughly versed in the fine points of magneto telephone engineering.

Rural lines are not included under this heading. These shall always be scored separately from the exchange itself and separate directions for the proper scoring of rural lines (and exchanges composed of rural lines exclusively) will be prepared at an early date.

The scorer shall not inquire into the age of the plant or equipment, but shall be concerned only with its **service giving condition,** as found, and it is wholly possible and proper for a 12-year-old plant, well maintained, to receive a higher score than a 5-year-old plant which has not been properly kept up. The object of such scoring is not so much to "show up" the poor condition plant as to locate the particular weaknesses producing the low score and the poor service which it evidences. In many cases a moderate expenditure to correct serious defects at some important point will produce a wonderful service improvement and lift an exchange from a low score to one considerably above the average.

Many eminent engineers will doubtless contend that the arithmetical basis of scoring, herein contemplated, is wrong and would probably make the final score dependent on multiplying together of scores representing the vital factors in the plant. Thus, on the theory of the chain with the broken link, a zero factor at any vital plant would result in a zero score for the entire plant.

For magneto exchanges such a system would be too severe and while it would doubtless be more just to make the final score partly arithmetical and partly on a factor basis, the straight arithmetical method has been selected as being one that will bring an approxi-

mately accurate result in all cases and having the great advantage of being so simple that any one of fair telephone knowledge and common sense can apply it and the owner himself, and all concerned, can understand the scorer's report and see exactly how the final result has been arrived at and which portions of the plant are already strong and which need further strengthening.

Magneto exchanges have been divided into three classes according to whether the subscribers' lines are "metallic," "mixed" or "grounded."

"Metallic" magneto exchanges are those in which 95 per cent or more of all subscribers' line circuits (exclusive of rural lines), are two-wire loops from the Central Office to the subscribers' telephones.

"Mixed" magneto exchanges are those in which less than 95 per cent, but more than 5 per cent of all subscribers' line circuits, are **"Metallic,"** as above defined.

"Grounded" magneto exchanges are those in which 95 per cent or more of all subscribers' lines are single wire with ground return (or a **"common return"** wire, serving two or more lines) from the subscribers' telephone to the Central Office or to the cable terminal. **"Common return"** lines and **"ground return"** lines will both be classed as **"grounded,"** even though carried metallic through the cables and grounded, or **"commoned,"** at the outer cable terminal.

A 100 per cent perfect magneto exchange is assumed to be made up as follows:

	Credits.
Central Office Switchboard Equipment, 100% good.....	25
Central Office Protective Equipment, 100% good.....	2
Central Office Power Ringing Equipment, 100% good...	3
Cables and cable terminals, full metallic and 100% good..	22
Pole lines, guy and cable supporting strand, 100% good..	10
Open wire distribution full metallic and 100% good.....	15
Drop wires and interior wiring metallic and 100% good..	3
Subscribers station equipment, 100% good.....	20
Total Credits for 100% perfect Magneto Exchange..	100

Each separate heading shall be scored separately on a basis of 100 per cent for perfect condition with proper deductions from the perfect percentage for defects as specified, and only the remaining percentage of the number of credits allowable to this heading are to be set down as a part of the final score for the entire exchange. Thus if the condition of the Central Office switchboard is found to be 60 per cent, only 60 per cent of 25, or 15 credits, shall be given for the switchboard, and, if after scoring each separate heading in like manner the sum of the credits to the exchange is found to be 65, the service rendering condition of the exchange, as a whole, may be accurately described as 65 per cent.

It will be noted that the Central Office equipment, plus the subscribers' telephone equipment, totals 50 credits, while the outside plant also totals 50 credits. Thus, if desired to score the inside equipment and outside plant separately, each on a basis of 100 per cent, it is only necessary to double the number of credits found for all items.

Should any item in the above schedule be found entirely missing, it shall be given a zero score if its place be taken by anoher item. Thus in a high-class all-cable plant, containing no open wire, the cables which, in such case, take the place of both cables and open wire shall be scored on a basis of 22 plus 15 or 37 credits for perfect condition. In like manner in a very small exchange where no paper insulated, lead encased cable is used and all lines are brought in direct with heavy rubber insulated wires and possibly without protection on the office pole; such construction should be recognized as standard and suitable for such small plants and the open wire, including the spider wire cable, should be scored as a whole on a basis of 22 plus 15 or 37 credits for perfect condition.

Where mixed underground and aerial cable distribution is encountered, the underground cable work, exclusive of the cable itself, shall be considered in connection with the pole line item and the title of the pole line item changed to indicate that the pole lines and underground cable ducts or trenches have been scored together. If considered necessary to separate the underground cable ducts, or trenches, from the pole lines the scorer may do so by dividing the total 10 credits between the two items in proportion to their respective importance in the plant under consideration. In like manner the underground and aerial cable may be scored separately by distributing the total of 22 credits between the two classes of cable in proportion to their importance.

TESTING APPARATUS REQUIRED

The testing equipment necessary for scoring magneto telephone exchanges is as follows:

1—High frequency, low potential, tone device producing artificial voice current of 400 to 900 cycles, preferably at a potential not exceeding one volt to avoid heating, and making good, contacts defective to actual voice current. In the abscence of special tone apparatus an ordinary telephone induction coil may be used with a high frequency buzzer and dry cell in series with the primary and a low shunt across the secondary to reduce the tone to low potential.

1—1000 ohm non-inductive resistance coil to be placed in series with the shunted secondary when testing for low impedence bridges across cord circuits.

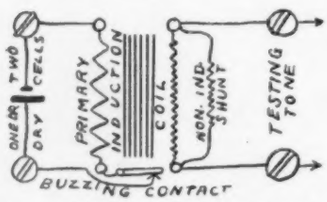


Fig. 1—High Frequency, Low Potential Testing Tone Equipment.

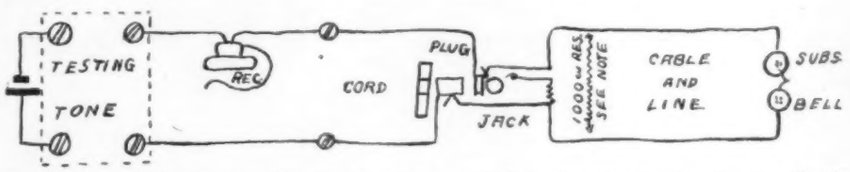


Fig. 2—Proper "Set-up" for Testing Combined Drops and Jacks for "Cut-Outs" and Short Circuits, Using Testing Plug Worn to Limit Size. Line Capacity and Telephone Bell Will Ordinarily Pass Enough Current to Give Tone. Use Non-Inductive Resistance at Main Frame Only When Found Necessary to Get Tone.

1—3-bar hand magneto with magnets shunted with soft iron to produce 80 volt alternating current for testing purposes when turned at uniform speed.

1—10,000 ohm non-inductive resistance to be placed in series with the 3-bar magneto generator above described for testing 80 or 100 ohm line drops for operation.

1—15,000 ohm non-inductive resistance coil to be placed in series with line and ring off drops wound to 500 ohms, or higher, for testing same for operation in series with the 80 volt magneto generator above described.

1—Alternating current voltmeter 0-150 volts for determining potential of A. C. testing current and ringing current.

1—Micrometer for ascertaining plug wear.

1—1000 ohm polarized buzzer or ringer, without gongs, with adjustable biasing spring and key for reversing connections for testing ringing current for strength and wave balance.

1—Direct current portable voltmeter, Weston No. 280 or equivalent, 0 to 3 volts, not over 200 ohms internal resist-

ance, scale graduated in ohms or with table for translating deflections into ohms, using two new dry cells as source of 3 volt current.

1—Head receiver and band with two 20-foot single conductor test cords and a pair of spring test clips.

The foregoing material of suitable quality can be procured on the market at a cost of not to exceed $80.00.

A high resistance voltmeter with an internal resistance of 10,000 to 100,000 ohms is most valuable in connection with cable insulation tests but can be dispensed with if 100 volt direct current be available for use with the low resistance volt-ohmmeter.

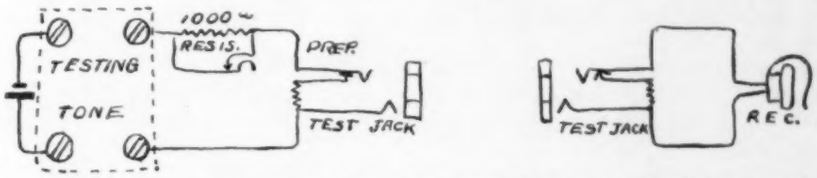


Fig. 3. Proper "Set-up" for Testing All Forms of Magneto Cord Circuits for "Cut-Outs" and Short Circuits or Low Bridges. Observing Receiver Should Be Worn on One Ear and Regular Operator's Receiver on the Other Ear to Detect Any Improper Functioning of Listening Key.

DETAIL DIRECTIONS FOR TESTING MAGNETO SWITCHBOARD EQUIPMENT

The following tests should, whenever possible, be made at night to avoid interference with regular traffic and to secure more accurate results through absence of confusion at the time the tests are made.

Line Drops—Connect to switchboard side of testing shoe, or, in its absence, pull fuses or heat coils from a number of lines and connect to switchboard side. Turn generator to secure approximately 80 volts and test drops having 200 ohms resistance or less through 10,000 ohms and drops having more than 200 ohms through 15,000 ohms.

In small exchanges, having 100 lines or less, all line drops should be tested. In larger exchanges the testing of 20 to 50 per cent of the lines will be sufficient, the higher percentage being tested when some of the drops are found inoperative. All lines failing to respond to this line drop test should be further tested by having the subscriber call in, and, if the drop be found readily operative from his telephone it shall be considered good, the object of the 80 volt test being to locate drops on which the subscriber may be having trouble calling in. It may be that certain subscribers will be having trouble operating drops which fall on the standard test, but in such cases the trouble is not switchboard trouble but will probably be due to excessive line resistance or an extremely weak generator at the subscriber's station.

It is of course necessary for the tester to determine the resistances indicated by the drop markings by the use of his volt-ohmmeter in order that the proper resistance may be used in the testing circuit.

Where reliable power generator current is available same may be used in place of the 3-bar hand generator, care being taken to adjust the potential to 80 volts by changing the amount of battery on pole changers or by shunting the current delivered by other forms of ringing devices.

"Ring-off" Drops should be tested in exactly the same manner as line drops. It is not necessary to open up the two halves of double supervisory cord circuits as the additional bridge of the 2nd ring-off drop and two condensers in series may be regarded as negligible. Ring-off drops shunted by condensers and in series with repeating coil windings should operate through 10,000 ohms, but ring off drops in single supervisory repeating coil cord circuits should not be condemned for failure to operate through 10,000 ohms as it is recognized that this is a very difficult condition and one excusable only because toll connections are supposed to be closely supervised.

Night Alarm Contacts should be tested by allowing the drop shutter to fall the full distance as when operated by the subscriber. The requirement that the night alarm operate when the shutter is "eased down" is unduly severe.

Testing Line Jacks: Select and remove a plug found to be worn to approximately 95 per cent of its original diameter midway between tip and shoulder. (As practically all magnetic switchboards use new plugs measuring .249 to .2495 inches, the micrometer should be set at .237 in. to determine plugs worn to the discard point above mentioned.)

Be sure this plug is fitted with a reliable cord free from cutouts. Connect the tone test and the observing receiver in series as indicated in Fig. 2. Insert the plug and pull it in all directions in which it might be pulled by cords or bumped by the operators in regular use, and listen for cut outs or changes in the steady tone in the receiver. A moderate increase in loudness indicates that the drop contact in failing to break, while a great increase in loudness indicates that the plug or the jack springs become short circuited in certain positions, in which case the jack should be considered defective.

If line circuit resistances are to be measured with the volt-ohmmeter, this tone jack test can be dispensed with and the volt-ohmmeter needed observed for holding steadily while the worn plug is "wiggled."

Cord Circuit Keys and Cords should be tested by means of the set up indicated in Fig. 3.. The tone should be connected to one of the regular switchboard jacks and the observer's receiver should be connected to another switchboard jack and the cord circuits used to interconnect the two. For a complete test the observer should wear the regular operator's receiver on one ear and the testing receiver on the other ear in order to test the ability of the operator to listen in reliably on the connection without interrupting the talking parties.

After putting up a cord pair for test the observer should switch off the power generator on the position and operate each ringing key at least three times to insure that the normal talking contacts always make. He should also brush the cam levers lightly in various directions as they are likely to be brushed, by the operator, in regular service. The listening key should also be tested and when it is operated tone should be present in both receivers. Any keys showing cut outs on these tests should be condemned. The keys showing defective on these tests should be marked or

charted and after completion of these tests and the cord tests hereafter described, the power generator should be turned on and all keys tested for proper ringing and against excessive generator noise in the talking circuits and any keys found good on the first tests, but deficient on the latter tests, should be considered defective.

Cords should be tested while both plugs are inserted for the key test. Bind the plug with one hand to prevent the possibility of cutouts in the jacks, wiggle the cords in all directions, condemn all which show interruption of the tone, either through cutouts or short circuits.

Plugs shall be tested by setting micrometer, or gauge, at 95 per cent of diameter of new plug and considering defective all plugs showing smaller diameter midway between tip and shoulder.

Ring Off Drops: See directions immediately following those for testing line drops.

Operator's Set. Battery potential while on transmitter should be not less than 1.8 volts for low resistance transmitters and not less than 2.8 volts for high resistance transmitters. For efficient receiving induction coil secondaries should not be higher than 60 ohms, particularly in large core coils. Receiver diaphragms should be not less than .010 or more than .017 inches from pole pieces and a spacing between of .012 to .015 inches is preferable. Actual transmitting and receiving qualities shall be tested and the observer must use his best judgment in scoring the operator's set on a basis of 100 per cent for standard transmission and receiving.

Transfer Circuit Jacks shall be tested at same time and in same manner as regular line jacks, by plugging other end of transfer circuit into a suitable line.

Transfer Circuit Cords and Plugs shall be tested in same manner as other plugs and cords by plugging tone into the jack end of the tranfer circuit and placing the transfer plug in the jack to which the observing receiver is connected.

All of the foregoing tests are readily made without special or elaborate apparatus. They require but little time and the results set down as directed herein, furnish with mathematical accuracy the percentage figure which truly portrays the **service giving condition** of the equipment.

CENTRAL OFFICE SWITCHBOARD EQUIPMENT SHALL BE SCORED AS FOLLOWS

	Points.
Line drops or signals operative on test or from subscribers' stations	6
Switchboard line cabling all good and connections soldered or screw terminated at both ends	4
Cord circuit cabling in good condition with ringing circuit carried exterior to talking circuits and all soldering good	4
Cord circuit keys functioning properly and free from "cut outs" and excessive generator noise	20
Cord circuit cord pairs free from cut outs (If either cord be defective, score the pair 0)	15
Cord circuit plug pairs showing not less than 95% of original diameter midway between tip and shoulder (If either plug be defective, score the pair 0)	6
Cord circuit ring-off drops, take singly; but it case of single supervisory **local** cord circuits figure one ring off drop in each cord circuit as missing	20
Operators' sets fully efficient both in transmission and receiving	5
Night alarm contacts operative when drops fall	10
(Where night operator is not allowed to retire eliminate this item and change maximum credits on key and cord items to 25.)	
Jacks functioning and free from cut outs with worn plug showing only 95% of original diameter midway between tip and shoulder	10
(**SPECIAL**—In case of magneto multiple equipment, multiple jacks shall be considered a part of the line equipment and in case any multiple or answering jack is found defective the jack equipment for that line shall be scored 0 the same as in case of a defective jack in a non-multiple board)	
Total points allowable as per above	100

(Less special deductions as hereafter explained, equals net condition of switchboard equipment.)

CENTRAL OFFICE PROTECTIVE EQUIPMENT

Figure any insufficiency of cord circuit keys, plugs and cords as present but 100 per cent defective.

If jack and plug ended transfer circuits are present, figure each transfer jack as 5 additional line jacks and each transfer plug cord and plug as an additional pair of cord circuit plugs and cords and charge up any sufficient quantity of transfer circuits as present but 100 per cent defective.

If double jack ended transfer circuits are present figure each pair of transfer jacks as 5 line jacks scoring the pair 0 if either jack be defective. Also charge up each double jack ended transfer circuit with a missing plug and cord regardless of the number of cord circuits present.

Repeating coils are required in magneto cord circuits only for the connection of long distance or rural metallic lines (terminating without line repeating coils) with grounded lines and are not required for the connection of local metallic lines with grounded lines. Any shortage of repeating coil cord circuits needed shall be charged up as present and 100 per cent defective and any repeating coil circuits not distinguishable from ordinary cord circuits shall be charged up as 50 per cent defective, only half of the total key, plug, cord and ring-off drop equipment in such cord circuits being credited.

If supervisory lamps, controlled by relays, are used in place of ring-off drops consider the lamp and relay as a unit equivalent to the usual ring-off drop.

Special Deductions: If switchboard drops are manual restoring deduct 20 per cent of net credits found by the foregoing schedule.

Under the heading of Ceneral Office Protective Equipment is included the apparatus which is, or should be, provided to protect the central office equipment against lightning and other foreign currents which may be present and it also includes the necessary cross connecting equipment between street cables and switchboard cables.

For exchanges of 350 lines and less, wall or floor type racks shall be considered satisfactory if provided with carbon lightning arresters and flat mica fuses suitable to protect against excessive light or power currents passing the carbon arrester. Such racks must also afford satisfactory cross connecting facilities and all wire connections not made under screw terminals shall be well soldered. In exchanges having over 350 lines such racks shall be subject to a special deduction of 30 per cent from their net score.

For exchanges, either larger or smaller than 350 lines, floor or wall type main frames with carbon lightning protection and tubular fuses between street cables and carbons and with proper cross connecting facilities, shall be considered satisfactory except when 220 or 500 volt direct current is to be protected against, under

which condition a heat coil or graphite heat rod, designed to open and ground the line, shall be furnished in place of, or in addition to, the tubular fuse. The proper percentage for the protective equipment must be determined according to the scorer's best judgment, considering first the adequacy of the protection; second the effect of any unsoldered joints, smutty carbons and high resistance heat coils, or heat rods, on the general efficiency of the plant, and lastly, the presence of alarm devices, if provided and operative, to automatically indicate interruption of service through blown heat coils.

The scorer should set down his honest opinion of this equipment's relation to 100 per cent of what it should be, multiply the constant 2 by this percentage, and set down the result to the credit of the entire plant.

POWER RINGING EQUIPMENT

In exchanges serving less than 150 subscribers (including those on rural lines) the absence of a power ringing device shall not be considered a defect. This item should then be eliminated and its three credits transferred to the switchboard and the latter's importance increased to 28 credits.

When power ringing equipment is missing in exchanges of more than 150 subscribers, the scorer may give the item a zero credit if convinced the equipment is really needed but if he considers the absence of power ringing equipment less than 3 credits of importance he may transfer 1 or 2 of the 3 credits to the switchboard equipment before setting down the zero score for the ringing equipment.

Wherever power ringing equipment is found it shall be scored on the basis of its efficiency and ability to properly code ring the heaviest rural and toll lines connected to the exchange. For while such lines are scored separately the possibility of getting parties thereon is of interest to the local subscriber.

The frequency should be approximately 20 cycles per second which can be determined closely enough by the ear. The A. C. voltage on open circuit should not be less than 70 nor more than 120 and the equipment should have output sufficient to maintain an A. C. potential of at least 50 volts across the terminals of an ordinary 25-watt, 110-volt Mazda lamp.

The percentage of the voltage shown on this test to 50 volts may be taken as the percentage of efficiency provided the alternating current is not found to be unbalanced.

In the case of vibrating pole changer equipment the two waves should be approximately equal in strength as tested by a 1000 ohm biased polarized ringer or buzzer, and if found unequal the weaker half of the wave should be the one considered, and from 15 to 30 per cent deducted from the percentage arrived at by the A. C. voltmeter test. If it is desired to determine accurately the voltage of the weaker set of waves, set the biasing spring up tight and gradually release it until the ringer starts to operate with the weaker wave opposing the biasing spring. Then connect the ringer and A. C. voltmeter across a hand generator and note the voltage shown when the hand generator starts to operate the ringer when gradually speeded up. No ringing current is stronger than the weaker wave and a biased ringer with reversing key should be used with each vibrating pole changer to keep the latter in proper balance.

CABLES

Cables, as herein considered, include all paper insulated lead enceased telephone cable used between the protective equipment in the office and the bare line wires, or drop wires, of the distributing system.

Hand made cables of rubber covered spider wire or machine made or leaded cables or spider wire, as used in extremely small exchanges, are to be considered as combined with the wire plant.

In scoring cables multiply each of the credits by the fraction of the total cable conductors complying with the conditions for which the credit is allowed and set down the products to be summed up for the cable percentage.

	Points.
For properly terminating inside ends of cables in sealed pot heads or by splicing on wool or silk and cotton insulated lead cable, credit	5
For proper suspension so cable sheaths will not crystallize by swinging in the wind, credit	5
For use of substantial metal hangers (in place of Marlin), credit	5
For use of Composition Sheath with small percentage of tin or antimony in aerial work, credit	5
NOTE—In underground work where cable is laid in trench or pulled into conduit, consider pure lead sheath equal to composition sheath and score accordingly.	
For placing cable in trench on tar paper and covering with half tile or split sewer pipe, or for placing of cable in a small sub-trench on tar paper and covering with creosoted plank, or for cable pulled into fibre or vitrified conduit, credit same as perfect aerial cable.	
For cable buried directly in contact with the earth, or in any other manner not mechanically equivalent to one of the foregoing methods, allow no placing credit. Also, if underground cables are not properly brought up poles with bent iron conduit, credit 3 points instead of 5.	
For perfect connections, soldered or screw, at both ends of cable, credit	5
For high insulation resistance, indicating freedom from dampness, credit	40
and decrease this credit according to degree of dampness and low insulation down to no credit for cables found to be water-soaked.	
(When 110 volt D. C. or dry batteries as source of ringing power with 90 to 100 volts of D. C. is available, rough insulation tests may be made from the office by grouping five scattered cable pairs and opening fuses at both ends when each 1/10 volt deflection on the 200 ohm 3 volt scale indicates approximately 1/5 megohm or roughly 1 megohm per pair, and this multiplied by the length of the cable under test, gives a good idea of the insulation resistance per pair mile.)	
For proper sealing of cable at outer terminal end, credit..	15
This sealing may be in a metal chamber with steel cover and rubber gasket, or it may be in form of a well made pot-head, but, whenever paper insulation is found fanned out in other than an air-tight chamber, give no credits for this feature regardless of how cables may have shown up on insulation resistance test.	
For carbon and fuse protection in perfect condition between open wire and cable, credit	20
Total	100

In magneto plants employing open wire distribution, carbon lightning arresters should be used at cable terminals with fuses, preferably of tubular construction, placed between the rubber covered spider wire and the carbon. This is to prevent the melting of the carbon arrester and the possible destruction of the entire terminal by a sustained arc of high amperage in the carbon arrester.

In all-cable construction, with no protection between cable and drop wires, and with the larger cables underground and the smaller ones aerial, it is custom-

ary to regard the aerial cable distribution as corresponding to the open wire distribution formerly used, and the underground cables as corresponding to the former aerial cables, and, just as fuses were formerly placed where open wires entered the aerial cables, so fuses are now placed between the open cable distribution and the large underground cables. In such cases, the full 20 points of credit shall be given in the case of aerial cable terminating unprotected in more than 1000 feet of bare wire.

POLE LINE GUYS AND CABLE SUSPENSION STRAND

The placing of a proper score on this division must be largely a matter of judgment, but the accompanying table of credits to be given will serve as a guide to a proper result.

	Points.
For poles adequate in quantity, credit	10
For poles adequate in size and quality, credit	10
For anchors adequate in size and quantity, credit	20
For guying adequate, corners and dead ends holding, credit	20
For messenger strand adequate and well put up, credit	10
For absence of dangerous or critical situations, credit	30
Total	100

OPEN WIRE DISTRIBUTION

Open wire distribution is taken to include bare wire carried on cross arms between cable terminal, and subscribers' drop wires. Cross arms, with their pins and insulators, shall be scored on a basis of 30 points for perfect conditions, and wire on a basis of 70 points.

Of the total of 30 points for arms and pins, the corner and dead end arms should constitute 20 points and the arms on straight-away sections of the lead should count 10 points.

The scoring of cross arms with their pins and insulators must be largely a matter of judgment, but points credited should be roughly the same part of the total points allowed as the "contacts" of wire to support in good condition for each class of arms are to the total number of "contacts." Arms at corners and dead ends, pulled out of shape so badly as to constitute a fruitful cause for trouble, should be considered fully defective as should also single arms on corners and dead ends not back braced in any way. Broken pins, insulators, or tie wires, should be considered as constituting "defective contacts."

The wire plant shall also include the spider wire at the cable terminal.

The scoring of the 70 points of line wire should be on a basis of 30 points for mechanical condition, with particular reference to possibility of trouble, and 40 points for conductivity, lack of which is the principal point of weakness in so many magneto exchanges.

Wires up in good shape and free from trees and foliage and sufficiently tight to not cross up in an ordinary wind storm or when poles are climbed by the lineman and which are not badly rusted, may be considered as possessing a mechanical condition of 30 points and so far as the lines fall short from this ideal condition, they should be scored accordingly.

Conductivity, the most important feature in open wire distribution, is fortunately very easy to test. Such tests can be best made from the central office switchboard by means of the volt-ohmmeter and 2 dry cells. By connecting these to a testing plug the resistances of the lines can be called off and set down almost as rapidly as the jacks can be plugged.

This test, of course, gives the total resistance of the entire loop but as the trouble in case of high resistance loops is almost invariably found in the wire plant this is really a fair test. Neither is it necessary to short-circuit the telephone instruments as advantage can be taken of the fact that magneto exchange telephones are usually fitted with 80 ohm or 1000 ohm ringers. Thus any reading under 1000 ohms indicates an 80 ohm ringer and any reading over 1000 ohms usually indicates a 1000 ohm ringer, and by subtracting the probable ringer resistance from the total resistance indicated the resistance which the subscriber has to talk through is accurately determined.

The maximum "legitimate" resistance should be placed 50 per cent in excess of what the longest exchange lines should measure with all joints perfect and all lines exceeding this maximum limit should be scored zero. This may appear as a somewhat harsh condition, but it no more than offsets defective lines with 80 ohm ringers which will "get by" through the erroneous assumption that the ringers are 1000 ohm. The test is readily and swiftly made on all lines in the exchange and without disturbing the subscriber.

In the case of single wire grounded lines, the maximum allowable resistance shall still stand at 50 per cent in excess of the proper resistance of the longest exchange loops in view of the difficulty of securing ground connections of low resistance.

If it is found that a few 1600, 2000 or 2500 ohm ringers are in service on exchange lines, the subscriber shall be called when resistances higher than 1600 ohms are noted and the resistance calculated from the defection shown after he takes down the receiver, it being remembered that 300 ohms is the maximum allowable resistance for a telephone talking circuit.

The 40 points allowable for satisfactory conductivity shall be multiplied by the percentage of the total lines showing such conductivity and only the product considered in arriving at the wire plants percentage and the total credits due the exchange on its account.

DROP WIRE AND INTERIOR WIRING

Under this heading is included all wire used between the cable terminals or bare line wires and the subscriber's telephone. Freedom from trouble and good conductivity are the essential points to be considered. Scoring of this division shall be on the following basis:

	Points.
Drop wires suitably connected to line wires or cable terminals, credit	10
(Copper or copper clad drops shall be considered suitably connected to iron line wires only when soldered or connected with combination test connectors or combination sleeves.)	
Drop wires suitably installed to avoid trouble from interference with other wires, tree chafing, etc., credit	10
Drop wires of suitable material, as hereafter specified, credit	40
(Twisted pair drops shall be rubber insulated with saturated braid over rubber. The minimum conductor sizes should be No. 16 B. & S. for hard drawn copper, No. 17 B. & S. for copper clad steel, and No. 18 B. W. G. (or No. 16 B. & S.) for iron wire. Metallic circuit drops, if not twisted pair, may consist of two weatherproof insulated wires not smaller than No. 14 B. & S. hard drawn copper or No. 14 B. W. G. iron. Also in the residence districts, one bare and one weatherproof wire shall be passed as satisfactory.)	
(For single wire grounded line drops one bare wire shall be considered adequate.)	
Interior wires, suitably connected to drop wires, credit	10
(Copper interior wires shall be considered suitably connected to iron drop wires and iron ground rods outside of buildings only when soldered.)	

Interior wires suitably installed to avoid trouble, credit..	10
(In most approved installations, the heavy rubber covered, saturated braid drop wires should be brought through the wall and meet the rubber covered dry braid interior wire at the lightning arrester or junction block. However, full credit shall be given even in cases where rubber covered dry braid interior wire is brought outside if the interior wire shows its insulation is intact and no penalty shall be assessed in such cases for failure to use tubes.)	
Interior wires of suitable material, as hereafter specified, credit	20
Twisted pair interior wires should be rubber insulated with dry or saturated braid over each wire.	
Twisted pair rubber covered interior wires with braid over the twisted pair shall receive only half credit.	
Two separate, single conductor, "office" wires with paraffined **braided** insulation shall receive only half credit. Annunciator wires, single or double wrap, single conductor or twisted pair, shall receive no "material basis" credit nor shall any interior wire smaller than No. 20 B. & S.	
Total	100

A sufficient percentage of business and residence telephones should be visited to give a fair average on the drop and interior wiring and the total points creditable to each item as herein stated should be multiplied by the percentage of stations found satisfactory in such respect and only the product set down as the points creditable to the drop and interior wiring percentage and the credits to be given the exchange.

SUBSCRIBERS' STATION EQUIPMENT

The function of the subscriber's telephone most important as well as most variable being that of transmission, particular emphasis shall be laid on this feature, scoring being on the following basis:

	Points.
Battery not less than two dry cells and showing not less than 1.4 volts with receiver off hook	20
Transmission good from one new dry cell and "standard" from two new dry cells	30
If a milliammeter be available, all transmitters showing less than 60, or more than 300 milliamperes, of current pull from two new dry cells, should be scored 0.	
For receiver in good operative condition and functioning properly	20
Signaling circuit functioning properly	10
Instrument wired and assembled so as not subject to trouble	10
Lightning arrester free from carbon smut	10
Total	100

No penalty shall be assessed for absence of lightning arrester at subscriber's station if carbon arrester is provided at aerial cable terminal but if no arrester is provided at the aerial cable terminal the absence of arrester at the telephone shall be scored same as if a defective arrester were present.

A sufficient number of business and residence stations shall be visited to insure accurate average percentages for each item before casting up the percentage condition of the telephones and the total credits due the plant on their account.

SPECIAL DEDUCTIONS ON ACCOUNT OF GROUNDED LINES

The foregoing makes no provision for deductions because of grounded lines in place of metallic circuits. This is because the detrimental effects of grounded lines are many times as severe under certain conditions as under others. For this reason, deductions from the **net rating of the entire plant** shall be made of the following percentages multiplied by the fraction of the total lines not found full metallic.

	Percent.
With no paper insulated cables and no alternating current lighting system	20 to 30
With paper insulated cables and no alternating current lighting system	30 to 40
With no paper insulated cables with an alternating current lighting system	30 to 50
With paper insulated cables and with an alternating current lighting system	40 to 60

When alternating lighting systems are present the scorer should not fail to listen in on a large number of regular connections at times when the lighting current is on to determine the degree of interference experienced by subscribers from electric light induction as this is much more severe in some plants than in others. The maximum penalty should be assessed only when the disturbing current is on 24 hours per day and when the use of series lighting circuits and other unbalanced conditions on the same side of the street with the telephone leads results in a veritable "roar" of electric light induction.

The observer should also test for severity of cross talk on grounded lines by calling the operator and asking for test connections when visiting subscribers' telephones to get a line on the character of the instruments in service. The observer should submit a full narrative report of conditions found with respect to grounded lines and explain how he arrived at the particular penalty percentage assessed for the grounded lines found.

No special credit shall be given for carrying lines metallic to the outer end of cables and grounding one side at the cable terminal. If this has any beneficial effect on the service, indirect credit will be received through the observers assessing less than the maximum penalty percentage.

Postmaster General Squelches Strike

The first extensive strike of telephone workers occurring since government control of wires was assumed, which involved several hundred girl operators and electricians at Norfolk, Va., was settled November 1, upon a direct demand, addressed to the strikers by Postmaster General Burleson.

Mr. Burleson's telegraph message to the strike leaders said simply that no strike could be recognized in the government service. It said that the employees had twenty-four hours in which to return after leaving their positions, and that the management of the company involved had orders at the end of that period to fill all places left vacant with other workers, and to report the names of those leaving the service to the department here.

"I consider the action of the employees in going back to work an indication of their good faith and intention," said David J. Lewis of the control committee, "Compensation of all employees of telephone and telegraph companies now being operated by the government is a subject that is being carefully worked out by a special committee. Naturally the progress is slow, and some impatience is pardonable among employees. At the same time, the vast body of government servants recognize that the new spirit in their industry with the control seeks simply to get good service for the public and fair wages to the working staffs. The government will never be found trying to keep money that is rightfully due to the employees, for it is not interested in profits. That is the reason that so quick a settlement of labor troubles is possible."

"Armistice Day" Traffic

The Freak Demands that Marked Service on November 11, 1918

By CLIFFORD ARRICK

THE news that Germany had capitulated to the allied armies and signed an armistice on November 11 was the signal for what was probably the greatest patriotic demonstration in the history of the United States. There was a general suspension of business, and the telephone business offices in most cities gave the employees a holiday in order that they might take part in the general merry-making.

There was one class of telephone employees, however, who celebrated in a different way; namely, by sticking to their switchboards and handling a deluge of calls. Bell operators maintained the well-known tradition of "Service First," and many of them, although off duty, volunteered their services and took their places at the switchboards. The press and the public, although well accustomed to such work on the part of the operating forces, joined in expressing praise for the way the ever faithful operators met the emergency.

The first information of the German surrender came to Chicago by telephone from the Associated Press. Chicago had fairly outdone itself on November 7 when the report that the armistice had been signed was received at noon. On November 11, however, the shrieking of whistles and blowing of horns and a general bedlam at about 2 a. m. aroused people from their beds,and the streets were soon filled with cheering thousands. Any idea of working on such a day as this was probably the last thought in the minds of most of them. Between nine and ten o'clock the telephone was used more than during any one hour in the city's history. This rush of conversation was supplemental and in addition to the mad shouting which was making the streets a bedlam at the same time. In this one hour of the great victory celebration the telephone was used for more than 370,000 calls, which is 62,000 higher than in any other one hour on record. The nearest approach to this volume of traffic was on the day following the presidential election of 1916, while the result was in doubt.

Telephone employees reported at their offices as usual, but were soon excused for the day, and in the telephone buildings as in all other parts of the city were demonstrations of tremendous enthusiasm.

When the whistles began to blow on November 7 traffic began to leap almost immediately. Many traffic employees who were off duty lost no time in calling up because they knew their services were needed. Many of those at the switchboards disregarded the dismissal bells and it was necessary to persuade several to go home, as their services would be valuable in the evening. At the Superior office two day operators were discovered that evening, who had gone home but returned of their own accord.

At Rogers Park the entire force of evening supervisors called up and volunteered to come in at once.

When the celebration started early in the morning of November 11, numerous operators, supervisors, order clerks, chief operators and assistant traffic chiefs reported at once and many night operators gave up their sleep relief.

At the Edgewater office, in addition to operators and supervisors, two assistant traffic chiefs, the day and evening chief operators, two senior supervisors and one order clerk were on duty at 3:30 a. m.

On both Thursday and Monday the trouble positions proved very unpopular, as the operators assigned to run them said they felt like slackers to see everyone else working so hard.

The limited transportation facilities made it difficult for many of the force to reach their office, and many walked considerable distances. An Edgewater operator was in such a hurry to report at her office that she did not even stop to lace her shoes.

The operating forces were aided to a large extent by employees from other departments, including matrons, order clerks and men of the maintenance department, who gave able assistance in cashing nickels and taking down "disconnects." The matrons were cordially welcomed because they served breakfast to the employees.

In the Beverly district all chief operators had been requested, in case the alarm was sounded, to be at their respective offices not later than 6 a. m. on November 11. The Stewart and Prospect chief operators reported at five, and the Beverly chief operators at 5:30. At Stewart one of the Supervisors was at a party and came to the office immediately after the alarm was sounded. Two operators reported before six, and two others called and offered their services. All the operators who were called and requested to report at six or before the regular time did so. There were no absentees and the traffic was very heavy.

At Prospect two girls reported voluntarily at 3:30, worked until nine and returned in the evening. The senior supervisor and two operators came of their own accord at four. One supervisor reported at 4:45, although scheduled to be off duty. There was only one absentee at this office. At the South Chicago office two operators called and offered their services. There was only one absentee at this office. The evening chief operator had spent the night at Indiana Harbor and telephoned bright and early to see if she would be needed.

Five Pullman girls called in after the tidings were sounded and offered their services, a Stewart operator living near Pullman also telephoned and offered her services. There were no absentees at this office.

The Beverley office was no exception to the rule, and all the operators who were requested to report early did so, and there were no absentees.

Two Wentworth operators whose regular time is 9 a. m. voluntarily reported for duty at three, and two 7 a. m. girls came at five. One Oakland girl who was due at nine came at 4:45, and another at 5:30. Five Hyde Park A. E. operators called the chief operator at eight and asked if they could be of assistance. Three Yards operators voluntarily came in two hours early.

In the Central district offices a considerable increase in the night traffic was noticed immediately after the whistles began to blow. It came first from the newspaper lines in the Main and Central offices, and

was followed by a gradually increasing traffic on the nickel lines and from various outlying exchanges which were handling calls for the newspapers. The traffic continued heavy for an hour and a half or two hours, and then subsided until about 6 a. m., when there was another very noticeable increase in all classes of service. It reached its maximum about 10 a. m. and there was then a general decrease because of the rapid closing of the various business establishments throughout the downtown districts.

The night forces in the Central district offices were instructed to call off regular sleep reliefs and man the boards to the very best advantage, giving preference to newspaper and government telephones. As in the other districts, a large number of operators volunteered their services and those who were asked to come in early did so. With but one exception the day chief operators reported before 7:30.

In the Western district all the day chief operators made a special effort to reach their offices unusually early. The first on duty arrived a few minutes after five, and many were an hour and a half and two hours early. Two day supervisors reported for duty at 3:05, and five other operators and supervisors in the office arrived between six and 6:30. One evening operator worked three or four hours in the morning in addition to her regular evening tour. Another office reports the arrival of two operators between three and four, and in another the repair clerks who were scheduled to be off duty for the day came in early and worked all day. One operator, when she found the street cars blocked, hailed a passing auto truck loaded with merrymakers and came to the office on it.

The suburban exchanges of the Chicago Telephone Company were not one whit behind the city of Chicago, and all of them were swamped with traffic, and their operators showed the same spirit of loyalty as those in Chicago.

Throughout the country the same conditions prevailed. For hours the flying fingers kept time to the blaze of white lights across the great switchboards. Indianapolis celebrated on November 7th, but it was merely a warming up for the big event on November 11th, and at all the Bell exchanges in the city the operators came early or when off duty, simply because they knew they would be needed.

In Columbus, Ohio, a happy party of Bell employes rigged a huge twelve-inch gong on the fender of one of the company trucks and bedecked with flags, a bevy of pretty girls made the circuit of the crowd, the constantly ringing gong loudly proclaiming their approach.

The same peace celebration reports came from Detroit and the rest of the Michigan State Telephone Company's territory, and it is unnecessary to give details as Bell operating forces are animated by the same spirit everywhere. While other people were having a good time the telephone traffic forces were working the hardest. Traffic broke records, and at many places throughout the whole state there was general rejoicing.

The Milwaukee *Daily Sentinel* says that the busiest place in Milwaukee when the great peace news came was the Broadway office of the Wisconsin Telephone Company, and it was the same way all over the state. Not only was every light on the Broadway exchange lighted, but the trunk lines which connect the various exchanges were all busy. Operators could do nothing but repeat, endlessly, "Germany has surrendered. Call back again and I'll try to get you a line." As the company had received the news some time before the papers were out, special operators were put on and held in readiness, but even then the calls could hardly be handled.

"We cannot say too much for our girls," said F. M. McEniry, commercial superintendent. "One and all they stood by like soldiers. Although there has never been a situation like this before, there was not a sign of hysterics or impatience. After the excitement of the first few moments they all settled down to the business in hand."

For more than three hours the seventy-two operators were unable to cope with the situation. About ten minutes after the report was received that Germany had surrendered practically every light on the switchboad in all the telephone exchanges in the city flashed almost simultaneously.

On November 7, the false report sent out by one of the news associations to the effect that the armistice had been signed, spread through Cleveland like wildfire, resulting in the highest peak load the city has ever experienced. So great was the load at Main office that the 100 ampere fuse "blew out" twice. The service interruption did not exceed twenty seconds in either case, as one of the wire chief's force was at the fuse panel at the time.

Directories Furnish Peace Confetti

The paper "snowstorms" which darkened New York, Chicago and other big cities during the earlier hours of the big armistice celebration November 11 were composed largely of erstwhile telephone books.

The mystery was solved the next day when many business men, bankers, office managers and employees came down to work to discover that their telephone books were missing from the accustomed hooks. The books had been torn up to provide "flakes" for the celebration storm. Emboldened office boys confessed it on every hand.

As a result the information boards of the various downtown telephone exchanges had the biggest day's business in their history. They were simply overwhelmed with requests for the numbers.

At first the patient information clerks ventured to suggest that the numbers might be found in the books. The reply was invariable:

"But my book is missing—it disappeared in the peace hullabaloo."

The growing flood of such inquiries and explanations caused the telephone company to begin an investigation. Then it was that the mystery was solved.

It developed that all waste paper of the affected offices had been cleaned out by enterprising janitors Saturday afternoon while the forces of the aforementioned offices were out celebrating the half holiday. With the prospects of a "peace holiday" looming in their minds, the office boys had for once in their lives violated all precedent and been first to their various offices in the morning.

When the "paper snowstorm" broke, most of them sought in vain for paper where with to contribute to the fun. In their enthusiasm they laid hands on the first things that offered, which were usually the telephone books.

Telephone managers reported a regular flood of applications for new books.

Official Orders and Semi-Official Comment

Installation Charges Modified; Physical Connection Promised; Other Changes

Bulletin No. 15, Order No. 2352

November 18, 1918.

OWING to the cessation of hostilities the necessity for conserving labor and material has been relieved to some extent, thereby enabling the Postmaster General to modify Order No. 1931, issued under date of August 28, 1918, fixing certain charges for the installation of telephone service, and Bulletin No. 8, issued September 14, 1918, explanatory thereof.

Experience and careful investigation of the entire subject has demonstrated the fact that certain service connection charges covering to some extent the average cost of the initial expense of establishing service for new subscribers and of furnishing additional facilities to old subscribers should be paid by such subscribers and should not be borne by the entire body of telephone users. Therefore, a uniform schedule has been prepared which embodies rates that should not retard telephone development in any section and will place upon subscribers responsible therfor a portion of the costs incident to such service connections, leaving the balance as a charge on the business generally. This schedule will become effective December 1, 1918, applies to all telephone systems under the control of the Postmaster General and is as follows:

1. For individual and party line service..... $3.50
2. For each extension station connected with any class of telephone service..... 3.50
3. For private branch exchange service the charge for establishing service connection:
   (a) For each trunk line connecting the private branch exchange with a central office..... 3.50
   (b) For each telephone connected to the private branch exchange, except operators' telephone sets 3.50
4. To cover directory, account, circuit and switchboard expenses in cases where service is established by use of instrumentalities already in place in the subscriber's premises, and no change is made in the type or location of such instrumentalities 1.50

5. Service connection charges not to supersede mileage charges or installation charges and construction charges made because of unusual cost, but to apply in addition to such charges; however, in cases of special private branch exchange systems, not established under tariff rates but on a cost basis, installation charges may be applied to stations, and other equipment in lieu of the regular service connection charges prescribed herein for the stations connected.

6. Service connection charges not to apply to the service known as "service stations" or "switching service."

7. Service connection charges not to apply to "public telephones" or "public pay station" service established for the use of the public on the initiative of the wire service. The term "public pay station" as herein used not to be construed to cover service such as semipublic, guaranteed or rental pay stations.

8. Service connection charges not to apply to private line equipment, i. e. circuits and stations not connected with a central office for exchange or toll service; but installation charges may be applied in accordance with tariffs existing or hereafter established.

9. All charges herein described to be collected from all applicants for new service of the classes specified above at the time of application and prior to the establishment of such service, except that service may be established in advance of payment in the case of service connection charges for additions to the service of existing subscribers, and in the case of any service for Departments, Administrations and Agencies of the Federal, State, County, and Municipal Governments.

10. Section number 5, of Bulletin No. 8, dated September 14, 1918, is hereby revoked.

CHARGES FOR MOVES AND CHANGES.

Order No. 1931, dated August 21, 1918, and Telegraph and Telephone Service Bulletin No. 8, dated September 15, 1918, so far as relates to prescribing changes of location, are hereby revoked.

1. Charges for changes of location of telephone equipment or wiring on the subscriber's premises on and after December 1, 1918, to be:

   (a) For moving a telephone set from one location to another on same premises, a charge of $3.00.

   (b) For moving any other equipment or wiring from one location to another on the same premises, a charge based on the cost of labor and material.

2. Charges for changes other than moves, in wiring and equipment on the subscriber's premises, made on the initiative of the subscriber, to be:

   (a) For change in type or style of telephone set, a charge of $3.00.

   (b) For other changes in equipment or wiring, a charge based on the cost of labor and material.

3. The charges specified above not to apply if the changes or moves are required for the proper maintenance of the equipment or service.

4. The charges specified above not to apply if the changes are required because of a change in class or grade of service.

5. The charges specified above in no case to exceed the service connection charge applicable to the entire service of the particular subscriber.

A. S. BURLESON.

Telegraph and Telephone Service Order No. 2355

November 18, 1918.

ORDER No. 1997 appointed David J. Lewis, chairman, John C. Willever, vice-president Western Union Telegraph Company, and Edward Reynolds, general manager Postal Telegraph-Cable Company, a committee to make the necessary studies and recommendations to the postmaster general with a view to standardizing the rate schedules of telegraph service throughout the United States, is hereby amended by the addition of the names of Charles C. Marshall, Ohio Public Utilities Commission, and Joseph B. Eastman, Massachusetts Public Service Commission. A. S. BURLESON

Order No. 2356

November 18, 1918.

ORDER No. 1998 appointing David J. Lewis, chairman, Harry B. Thayer, vice president American Telephone and Telegraph Company, and Charles Y. McVey, president Ohio State Telephone Company, a committee to make the necessary studies and recommendations to the postmaster general with a view to standardizing the rate schedules of telephone service throughout the United States, is hereby amended by the addition of the names of Paul P. Haynes, Indiana Public Service Commission, and Noah W. Simpson, Missouri Public Service Commission. A. S. BURLESON.

Bulletin No. 10, Order No. 2348

November 18, 1918.

ON and after December 1, 1918, hotels, apartment houses, clubs, and similar institutions shall not charge any guest, tenant or member for telephone messages an amount in excess of that charged for such service at the public pay stations in the same exchange, nor shall they charge for private branch exchange stations an amount in excess of that actually paid by them for such stations.

A. S. BURLESON.

Bulletin No. 11, Order No. 2349

November 18, 1918.

THE experimental delivery by letter carriers of "night letters" sent by telegraph to certain offices having city delivery service having proven so satisfactory and resulted in improved and more efficient service to the public, the proper officer in charge of the telegraph service in cities having city delivery by letter carriers shall take up promptly with the local postmasters the question of having "night letters" delivered by the letter carriers in their respective cities, also "night messages" after January 1, 1919.

A. S. BURLESON.

Bulletin No. 12, Order No. 2350

November 18, 1918.

AFTER January 1, 1919, employees of the telegraph companies shall receive annual vacations with pay at their regular ratings as follows:

All regularly assigned employees who have been in the service of the company continuously for two years or more shall receive two weeks' vacation, and those who have been in the service continuously for one year shall receive one week's vacation.

Unassigned employees without other employment who have worked for the company the equivalent of full time for the periods given above, shall also receive vacations subject to the same regulations as the regularly assigned employees.

The telegraph business being a seasonal one, vacation schedules shall necessarily be arranged to meet the local conditions. It will not be expedient to arrange vacations for all during the so called vacation season, hence vacations must be taken when assigned regardless of the season.

These vacations are intended for rest and recreation, and employees are not expected to engage in other employment during such vacations. Vacations cannot be transferred in whole or in part to other employees, and shall be taken during the year in which they are due. They cannot be saved up from year to year and thereby extended into a longer period. If for any reason the vacation is not taken, no additional compensation will be allowed.

A. S. BURLESON.

Bulletin No. 13

November 18, 1918.

TO enable the public to use the long distance or toll service facilities to the fullest extent, any telephone company not having such facilities but desiring them should make application therefor in writing to the Postmaster General who will, if upon investigation it is found practicable to do so, order the connection established. A. S. BURLESON.

Bulletin No. 14, Order No. 2351

November 18, 1918.

PURSUANT to the proclamation of the President of the United States dated the second day of November, nineteen hundred and eighteen, I have assumed possession, control, and supervision of the marine cable systems of the United States. This proclamation has already been published and the officers and operating officials of the cable companies are acquainted with its terms.

Until further notice the marine cable companies shall continue operation in the ordinary course of business through regular channels. Regular dividends heretofore declared and maturing interest on bonds, debentures and other obligations may be paid in due course, and the companies may renew or extend their maturing obligations unless otherwise ordered by the Postmaster General. All officers, operators and employees of the marine cable companies will continue in the performance of their present duties, reporting to the same officers as heretofore and on the same terms of employment. Should any officer, operator or employee desire to leave the service, he should give notice as heretofore to the proper officer, so that there may be no interruption or impairment of the service to the public.

I earnestly request the loyal cooperation of all officers, operators and employees and the public, in order that the service rendered shall not only be maintained at a high standard, but improved wherever possible. It is the purpose to coordinate and unify these services so that they may be operated as a national system with due regard to the interests of the public and the owners of the properties.

No changes will be made until after the most careful consideration of all the facts. When deemed advisable to make changes, due announcement will be made.

Nothing contained in this order shall be construed to affect in any way the censorship of marine cables now conducted under the direction of the Secretary of the Navy under Executive Order of September 26, 1918.

A. S. BURLESON.

Bulletin No. 16, Order No. 2353

November 18, 1918.

IN order that the telegraph facilities may be used to the fullest extent and the transmission of messages expedited, the telegraph systems shall hereafter be operated as one, and effective December 1, 1918, all telegraph offices shall accept for transmission all classes of messages now accepted by any one of them at the prescribed tariff rates.

A. S. BURLESON.

Order No. 2363

November 20, 1918.

OWING to the cessation of hostilities, the restrictions heretofore placed upon telephone companies limiting extensions and betterments to imperative and unavoidable work to meet war requirements and the securing of adequate supplies, labor and transportation, are no longer deemed necessary. Therefore paragraph 1 of Order No. 1858 (Telegraph & Telephone Service Bulletin No. 4, dated August 15, 1918) is hereby revoked. A. S. BURLESON.

Legislation Affecting Telegraph and Telephone Service

November 19, 1918.

An Act Providing for the protection of the users of the telephone and telegraph service and the properties and funds belonging thereto during Government operation and control.

BE it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That whoever during the period of governmental operation of the telephone and telegraph systems of the United States by the Postmaster General, under the Act of Congress approved July sixteenth, nineteen hundred and eighteen, and the proclamation of the President dated July twenty-second, nineteen hundred and eighteen, shall, without authority and without the knowledge and consent of the other users thereof, except as may be necessary for operation of the service, tap any telegraph or telephone line, or willfully interfere with the operation of such telephone and telegraph systems or with the transmission of any telehpone or telegraph message, or with the delivery of any such message, or whoever being employed in any such telephone or telegraph service shall divulge the contents of any such telephone or telegraph message to any person not duly authorized or entitled to receive the same, shall be fined not exceeding $1,000 or imprisoned for not more than one year, or both.

Sec. 2. That whoever shall steal, purloin, embezzle, or without authority destroy any money, property, record, voucher, or valuable thing whatever of the moneys, goods, chattels, records, or property of any telephone or telegraph system operated by the Postmaster General under the Act of Congress approved July sixteenth, nineteen hundred and eighteen, and the proclamation of the President dated July twenty-second, nineteen hundred and eighteen, shall be fined not more than $5,000 or imprisoned not more than five years, or both.

Sec. 3. That whoever shall receive, conceal, or aid in concealing, or shall have or retain in his possession with intent to convert to his own use or gain any money, property, record, voucher, or valuable thing whatever of the moneys, goods, chattels, records, or property of any telephone or telegraph system operated by the Postmaster General under the Act of Congress approved July sixteenth, nineteen hundred and eighteen, and the proclamation of the President dated July twenty-second, nineteen hundred and eighteen, which has been embezzled, stolen, or purloined by any other person, knowing the same to be embezzled, stolen, or purloined, shall be fined not more than $1,000 or imprisoned for not more than five years, or both, and such person may be tried either before or after the conviction of the principal defendant.

Sec. 4. That whoever shall forcibly break into, or attempt to break into, any telephone or telegraph office, or any building used in whole or in part as such telephone or telegraph office, of any telephone or telegraph system operated by the Postmaster General under the Act of Congress approved July sixteenth, nineteen hundred and eighteen, and the proclamation of the President dated July twenty-second, nineteen hundred and eighteen, with intent to commit in such telephone or telegraph office or building, or part thereof so used, any larceny or other depredation, shall be fined not more than $1,000 or imprisoned not more than five years, or both.

Sec. 5. That whoever shall assault any person having lawful charge, control, or custody of any money or property of any telephone or telegraph system operated by the Postmaster General under the Act of Congress dated July sixteenth, nineteen hundred and eighteen, and the proclamation of the President dated July twenty-second, nineteen hundred and eighteen, with intent to rob, steal, or purloin such money or property, or any part thereof, or shall rob any such person of such money or property, or any part thereof, shall be imprisoned for not more than five years; and if in the effecting or attempting to effect such robbery, he shall wound such person having custody of the money or property, or put his life in danger by the use of a dangerous weapon, shall be imprisoned not more than ten years.

Approved October 29, 1918.

Association Comment

By F. B. Mackimon, Vice-President U. S. I. T. A.

Bulletin No. 13, notifying companies desiring unlimited toll service to make application for the same.

Bulletin No. 10, Order No. 2348 providing that hotels, apartment houses, and clubs shall not charge more for local messages than the charge for such messages at public pay stations.

Bulletin No. 16, Order No. 2353 providing for the consolidation of telegraph facilities.

Order No. 2363 revoking paragraph 1 of Order No. 1858 dated August 15, 1918, thereby removing the restrictions on extensions.

THESE four orders are of the greatest importance. The order removing restrictions upon extensions and additions gives managers of companies the same freedom of action in making installations and extending the properties under their charge that they had prior to Government control. Consideration, however, must be given by every manager to the conditions under which these extensions are financed as the Government must necessarily be a party to the financing. Managers should not solicit business but should take care of applications for service where the same can be made without involving large sums.

By Bulletin No. 13 a company can make application for connection with the toll lines of a competing system. The terms under which such connections will be permitted have not been disclosed. Each application will be considered on its own merits and not by a general rule. Companies should address applications as follows: Postmaster General, Telephone and Telegraph Service, Postoffice Department, Washington, D. C. This address should be used in connection with all correspondence with the Administraton regarding telephone matters.

The restrictions on the charges made by hotels for local calls has been ordered in response to a general complaint by the traveling public that the Administration is not justified in permitting hotels, clubs, etc., to make a greater charge than that made by the Administration from public pay stations. This order may seem to interfere with contracts between the companies and hotels. Where a manager considers that this is done we would suggest that he write us fully about the matter. This order is effective December 1.

By the order consolidating telegraph facilities, messages for Western Union and Postal offices can be filed with either company, the distinction between companies being practically wiped out by the order.

The issuance of these orders is the best answer that

can be given to the often asked question as to what procedure the Postmaster General intends to follow regarding the control of the telephone service. It is the intention of the Postmaster General to continue the task imposed upon him by the President of operating the telephone and telegraph properties until the end of the period specified in the resolution of Congress providing for Government control of the telephone and telegraph properties. Under this resolution the properties are to be returned to their owners when the President issued a proclamation announcing the ratification of the treaties of peace. Just when such a proclamation can be issued is, of course, entirely dependent upon when the peace commissioners arrive at an agreement as to the world treaties and those treaties have been ratified by the various nations. It is, therefore, expected that Federal control of the telephone systems will last for some time. Company owners and managers should make their plans accordingly.

It is expected that the orders just issued will be followed by other administrative orders until the whole machinery of Government control is in operation. Many companies, particularly the smaller ones, are disturbed over what is to them a very unsatisfactory condition. This unsatisfactory condition, we are told will be remedied. The task of organizing a new system of control is a very difficult one and has involved some slow processes due to legal requirements and to the fact that the Government is moving along hitherto unknown channels.

The general principles to be applied in connection with the fixing of compensation to the owners of the properties have been worked out. Contracts have been entered into with the larger companies and the machinery is ready to proceed with the smaller ones. Notice of this will be sent companies shortly. Due to the lack of proper machinery many communications from company managers submitting rate schedules and management problems have not been given prompt consideration. This is, of course, regrettable, but arrangements have been made for prompt action and all pending matters will be rapidly disposed of.

The foregoing comments are made for the purpose of explaining the situation to our member companies and to reassure them as to their status. No company need be disturbed over their not having had direct communication from the Administration nor should any company be disturbed because the compensation contract has not been entered into with them. The contract simply sets down in writing the terms under which the Government has been renting the properties from the owners since August 1. The relation between the Government and the property is not changed by the contract., Revenues and expenses since the first of August are the Government's. This fact does not seem to be thoroughly understood by all companies. Inquiries are received asking whether or not this company or that company is under Government control. It should be definitely understood that all companies were taken possession of on August 1 and since that date have been operated on Government account.

The Postmaster General appreciates the spirit of co-operation shown by the telephone managers throughout this difficult period. We have assured him that this co-operation will be continued and that he may rely upon the assistance of the managers in performing his difficult task until the end of the period of control.

Our general advice to you is to sit tight, not be disturbed by seemingly unnecessary delays, and if questions arise that demand an answer that you submit them to the Association.

Vail Invited to Assist

Postmaster General Burleson asked Theodore N. Vail, president of the American Telegraph & Telephone Company, for the benefit of his knowledge of electrical communications "with a view to a more extended use of telephone, telegraph and cable during the period of government control of land wires and American cable properties."

The letter, which was made public without comment, follows:

"I desire to avail myself of your broad knowledge, and experience, on the subject of electrical communications with a view to a more extended use of telephones, telegraph and cable during the period of government control of land wire and American cable properties.

"I take it that your studies of the past years have included in the consideration of the problem of universal wire service, with which you have dealt in your annual reports, the problems associated with a unified and extended cable system. Will you, then, be so kind as to give me the benefit of your studies and observations having special consideration to the problems as now presented, to the end that I may have before me for consideration suggestions growing out of your large experience?"

Year More, Says Lewis

Government operation of telephone and telegraph communications by the postoffice department will continue for at least a year, whether any step is taken by congress toward public ownership, says David J. Lewis of the department's control commission.

Mr. Lewis pointed out that though the statutes provide for briefer tenure by the government of the wire communications than of the railroads and other facilities taken over during the war the control continues until the president formally proclaims the exchange of ratifications of peace treaties. Completion of all peace treaties and exchange of ratifications by all nations, he said, might not come in two years.

Eight hundred places in the United States which hitherto have not enjoyed long distance telephone facilities are to be given them through government control of the telephone lines, according to Lewis.

"The order permitting physical connections will permit any subscriber in the United States to talk over any toll line," he said. "The result of the competitive system has been that the subscriber is denied the use of toll connection with other lines."

Bulletin No. 17, Order No. 2354

November 18, 1918.

THE following reductions in the rates for "night messages" by telegraph shall be made effective January 1, 1919:

Where telegram rate is:	Present "Night Message" rate is:	Rate Effective January 1, 1919:
25-2	25-1	20-1
30-2	25-1	25-1
35-2	25-1	25-1
40-3	30-2	30-1
50-3	40-3	35-1
60-4	50-3	40-1
75-5	60-4	45-2
1.00-7	none	50-2

Such "night messages" shall be subject to post office carrier delivery. This change in no wise affects the rate on telegrams sent during the night. A. S. BURLESON.

Design of Transpositions for Parallel Power and Telephone Circuits

Presented at the Convention of the American Institute of Electrical Engineers—Continued from October

BY HAROLD S. OSBORNE

APPENDIX A.—INDUCTION BETWEEN PARALLEL WIRES

Two Wires with Ground Return—Short Length of Exposure.—If the current and voltage in a short element of circuit No. 1 (Fig. 18) are represented by I and E, the inductive effect which this element of circuit No. 1 exercises on parallel circuit No. 2 can be represented as follows:

The voltage induced in circuit No. 2 because of current I is

$$V_2 = -j\,\omega\,I\,m\,l \qquad (1)$$

where ω equals 2π times the frequency, l the length of element of circuit considered and M the mutual impedance between the circuits per unit length. In the case of a perfectly conducting earth surface, M is made up entirely of the mutual inductance caused by the linkage of flux from circuit No. 1 with circuit No. 2. With a perfectly conducting earth surface this mutual inductance can be readily computed by the method of images. Under actual conditions the mutual inductance is affected by the resistance of the earth, which increases the linkages between the two grounded circuits because it causes the return current from circuit No. 1 to distribute more or less widely throughout the earth rather than to flow in a current sheet on the earth surface. In many cases, also, the fact that the two circuits both use the earth return having a finite resistance introduces an appreciable resistance term into the mutual impedance. Sometimes this term is very important.

The voltage induced in a short section of wire *2* because of the voltage between wire *1* and ground is

$$e_2 = E\frac{C_M}{C_2 + C_M} \qquad (2)$$

In this equation C_M and C_2 are the direct capacities from wire *2* to wire *1* and to the ground, respectively; that is, they are the capacities measured by the charges on wire *1* and on the earth when wire *1* is connected to the earth and unit potential is applied between wire *2* and the combination of wire *1* and earth.

If the short section of wire *2* is connected to the earth, the charging current flowing to ground is

$$i_2 = j\,\omega\,l\,E\,C_M \qquad (3)$$

That is the induced voltage acts like a generator having a voltage e_2 connected between wire *2* and ground through a condenser whose capacity is equal to the total grounded capacity of the exposed section of wire *2*. This is indicated in Fig. 19.

2. *Small Induced Effects.* In cases where the induced currents and voltages are small compared with the inducing currents and voltages so that their reaction on the inducing circuit can be neglected, the magnitude of the induced effects can be obtained by solving for the values of current and voltage in the disturbing circuit, neglecting the presence of the other circuit, and then applying equations similar to those given above for each element of the parallel between the two circuits.

3. *A Number of Parallel Wires.* The computation of induced currents is much complicated when there are several disturbing wires or several disturbed wires or both.

The computation of the electromagnetic induction may be complicated by the reaction between the induced currents in different disturbe dcircuits. In cases where the induced effect is small, however, the electromagnetic induction can be computed for this case as for a single circuit.

In determining electrostatic induction with a large number of parallel circuits, it is evident that it becomes exceedingly complicated to compute the direct capacities which are used. It is possible to greatly simplify this work in cases in which the disturbed and disturbing circuits are separated so that each group has little effect on the direct capacities of the other group. Under these conditions the direct capacities within the disturbing circuits can be computed and from this computation a determination can be made of the charge of electricity on each of the disturbing wires taking account of the voltages on all wires. From these charges it is possible to compute the potentials between the disturbed wires and ground if isolated in space. These potentials may then be assumed to regulate through the direct capacities of the disturbed circuits as indicated in the above discussion of induction between two parallel wires. In computing the flow of current with many disturbed wires the effect on one wire of the other wires must, of course, be considered.

This outlines briefly the method which is in use for computing the induction between three-phase power circuits and telephone circuits. The method sometimes described in the text books is incorrect in that it does not take account of the mutual reactions between the three conductors of the three-phase circuit which materially modify their resultant electrostatic field.

4. *Long Parallel Circuits.* In the case of two long circuits which closely parallel each other without means for neutralizing inductive effects, the reaction of the induced currents on the disturbing circuit cannot be neglected. If the circuits are very long there tends to be the same distribution of current and potential at the receiving ends of the disturbing and disturbed circuits as there would be if equal voltages were applied to the two circuits at the transmitting end. The simplest case of this sort is when the two circuits are symmetrical. The equations for this case are given in Appendix B. It may be seen that even in this case the equations are so complicated that their use in practice would be burdensome. Where there are many long parallel wires the problem becomes one of utmost complexity.

5. *Parallel Telephone Circuits.* In the case of telephone circuits many conductors are run very closely parallel for long distances. It would seem, then, that the general solution of the inductive effect between telephone conductors would be so complicated as to be hopeless for practical use.

In attacking this problem, however, we fortunately are not interested in the general case. If telephone cir-

cuits are suitable for commercial service they must be so arranged that the inductive effects between any two circuits are exceedingly small. This is, therefore, a case in which the reaction of the induced currents on the disturbing circuit can be neglected.

If one considers then a short section of close parallel between a disturbing circuit *1-2* carrying a voltage E and current I and a disturbed circuit *3-4* as indicated in Fig. 20 the voltage due to electromagnetic induction can be expressed as in equation (4)

$$e = j\,\omega\,I\,M\,l \qquad (4)$$

In computing the current flowing at A due to electrostatic induction one may represent the direct capacities in the form of a Wheatstone bridge as in Fig. 21. In this figure the direct capacities a, b, c and d represent the Maxwell capacity coefficients. Capacities e, f, g and h represent the sum of the direct capacities between the wires, *1*, *4*, *2* and *3* respectively and all other wires and ground. This grouping is permissible because the induced effects all being small, the other circuits on the pole line are practically at ground potential, and have the same effect on the mutual capacity unbalance between the circuits *1*, *2* and *3*, *4* as they would if actually connected to earth.

between any two circuits can be computed from the geometrical positions of the conductors. The mutual capacity unbalance can be computed readily from the table of measured values of direct capacity for all wires on a 40 wire pole lead. (Table I.) The capacities of course vary with the number and to a small extent with the size of conductors on the lead. Forty wires is a typical condition and has been used as representative. When desirable, correction has been made for the use of wires of larger size.

The above equations therefore present a thoroughly practical method of computing the current induced between short sections of two telephone circuits which are well transposed against each other. The correctness of the results obtained in this way has been checked by experiment.

APPENDIX B.—THE INDUCTION BETWEEN TWO LONG PARALLEL SYMMETRICAL CIRCUITS

Assume two long symmetrical wires, A and B, as shown in Fig. 22, operating with ground return. Assume the linear self impedances of the circuits to be z_1 and z_2 respectively, the linear mutual impedance to be M, and the linear direct admittances to ground and linear mutual

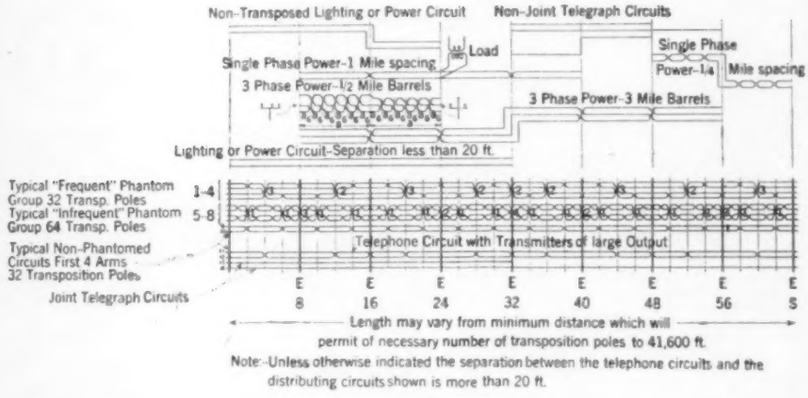

Non-Transposed Lighting or Power Circuit
Non-Joint Telegraph Circuits
Load
Single Phase Power-1 Mile spacing
3 Phase Power-1/2 Mile Barrels
Single Phase
Power-1/4 Mile spacing
3 Phase Power-3 Mile Barrels
Lighting or Power Circuit-Separation less than 20 ft.
Typical "Frequent" Phantom Group 32 Transp. Poles
Typical "Infrequent" Phantom Group 64 Transp. Poles
Typical Non-Phantomed Circuits First 4 Arms 32 Transposition Poles
Joint Telegraph Circuits
1-4
5-8
Telephone Circuit with Transmitters of large Output
E 8
E 16
E 24
E 32
E 40
E 48
E 56
E S
Length may vary from minimum distance which will permit of necessary number of transposition poles to 41,600 ft.
Note:-Unless otherwise indicated the separation between the telephone circuits and the distributing circuits shown is more than 20 ft.

Fig. 16.—Characteristics of Exposed Line E Section—Diagram Illustrates Length, Number of Transmission Poles and Permissible Locations of Transpositions and Discontinuities in Extraneous Disturbing Circuits.

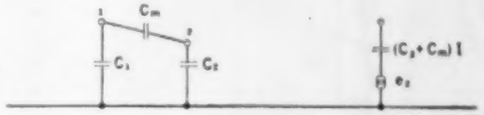


Fig. 18 *Fig. 19*

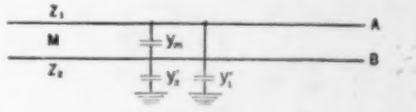


Fig. 22—Induction Between Two Symmetrical Grounded Circuits.

The induced current is represented approximately by equation (5)

$$i = j\,\omega\,E\,\frac{a'\,d' - b'\,c'}{a' + b' + c' + d'} \qquad (5)$$

$a' = a + \frac{h\,e}{s}$, $b' = b + \frac{e\,f}{s}$, etc., s being equal to $e + f + g + h$.

When the circuits are transposed so that the electrostatically induced current is small it results that in a balanced transposition section a', b', c' and d', are all very nearly equal. Under these conditions the magnitude of the electrostatically induced current in one small section of line is represented with a sufficient degree of accuracy by equation (6).

$$i = j\,\omega\,E\,\frac{a' - b' - c' + d'}{4} \qquad (6)$$

The equations given above indicate the coefficients of induction which must be determined in order to make possible computations of the induced currents between telephone circuits. The mutual inductance unbalance admittance to be y_1', y_2' and y_m respectively.

The differential equations for inductive effect between the two circuits are as follows:

$$\frac{-\,d\,v_1}{d\,x} = i_1\,z_1 + i_2\,M \qquad \frac{-\,d\,v_2}{d\,x} = i_2\,z_2 + i_1\,M$$

$$\frac{-\,d\,i_1}{d\,x} = v_1\,y_1 - v_2\,y_m \qquad \frac{-\,d\,i_2}{d\,x} = v_2\,y_2 - v_1\,y_m$$

In the above formulas, $y = y_1' + y_m$, $y_2 = y_2' + y_m$, and M and y_m are both written as positive quantities.

For the case of two symmetrical wires let

$$z_1 = z_2 = z$$
$$y_1 = y_2 = y$$

Use is made of the following auxiliary equations:

$$A = 2\sqrt{\frac{z - M}{y + y_m}} \qquad B = \frac{1}{2}\sqrt{\frac{z + M}{y - y_m}}$$

$$\gamma_s = \sqrt{(z - M)\,(y + y_m)} \qquad \gamma_p = \sqrt{(z + M)\,(y - y_m)}$$

Equations are given below for a number of conditions which are of interest. In these equations, v_1 and i_1 repre-

sent the voltage and current on the disturbing circuit A at any distance x from the transmitting end, and v_2 and i_2 represent the voltage and current on the disturbed circuit B.

Case I. Voltage impressed on Circuit A at $x = O$ is E_1.

Circuit B connected to earth at $x = O$ through impedance W. Both circuits infinite in length.

$$v_1 = E_1 \frac{2\,B\,(A + 2\,W)\;\epsilon^{-\gamma_p x} + A\,(2\,B + W)\;\epsilon^{-\gamma_s x}}{W\,(A + 4\,B) + 4\,A\,B} \tag{7}$$

$$i_1 = E_1 \frac{(A + 2\,W)\;\epsilon^{-\gamma_p x} + (4\,B + 2\,W)\;\epsilon^{-\gamma_s x}}{W\,(A + 4\,B) + 4\,A\,B} \tag{8}$$

$$v_2 = E_1 \frac{2\,B\,(A + 2\,W)\;\epsilon^{-\gamma_p x} - A\,(2\,B + W)\;\epsilon^{-\gamma_s x}}{W\,(A + 4\,B) + 4\,A\,B} \tag{9}$$

$$i_2 = E_1 \frac{(A + 2\,W)\;\epsilon^{-\gamma_p x} - (4\,B + 2\,W)\;\epsilon^{-\gamma_s x}}{W\,(A + 4\,B) + 4\,A\,B} \tag{10}$$

Case II. If the resistance, leakance, and internal reactance are negligible and the equivalent height of the wires above ground is the same for static and magnetic

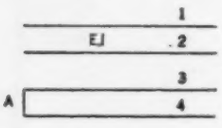


Fig. 20

Fig. 21

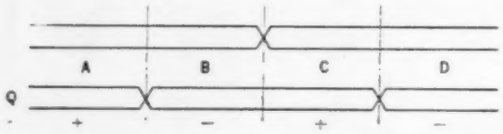


Fig. 23.

induction, $\gamma_s = \gamma_p$ and

$$\frac{A}{4\,B} = \frac{z - M}{z + M} = \frac{y - y_m}{y + y_m} \tag{11}$$

Then, if $W = \infty$, it follows that

$$v_2 = v_1 \frac{y_m}{y} \tag{12}$$

Under these conditions, ($\gamma_s = \gamma_p$ and $W = \infty$) the sending end impedance of the disturbing circuit is

$$Z_o = \sqrt{\frac{Z\,y}{y^2 - y_m^2}} \tag{13}$$

This equation shows that under these conditions there is no reaction from circuit B at the terminal of circuit A.

Case III. If $z\,y_m + y\,M = O$ (14)

Then $B = A/4$ and it follows that

$$v_2 = \frac{E_1}{2}\,(\epsilon^{-\gamma_p x} - \epsilon^{-\gamma_s x})$$

$$i_2 = \frac{E_1}{A}\,(\epsilon^{-\gamma_p x} - \epsilon^{-\gamma_s x}) \tag{16}$$

that is, at $x = O$, the induced voltage and current are O.

If y_m is negligible, equation (14) requires that $M = O$. This may be approximated by the use of compensating transformers. The above relation suggests, however, that by properly adjusting the value of M an approximate neutralization of induced voltage might be obtained in some special cases in which the electrostatic induction is considerable.

Case IV. When $W = \infty$, then at $x = O$,

$$v_2 = E_1 \frac{y\,(D - 1) + y_m\,(D + 1)}{y\,(D + 1) + y_m\,(D - 1)} \tag{17}$$

where $\frac{\gamma_p}{\gamma_s} = D$.

The ratio of this voltage to that computed by equation (12) gives an idea of the error involved in the assumption which leads to equation (12).

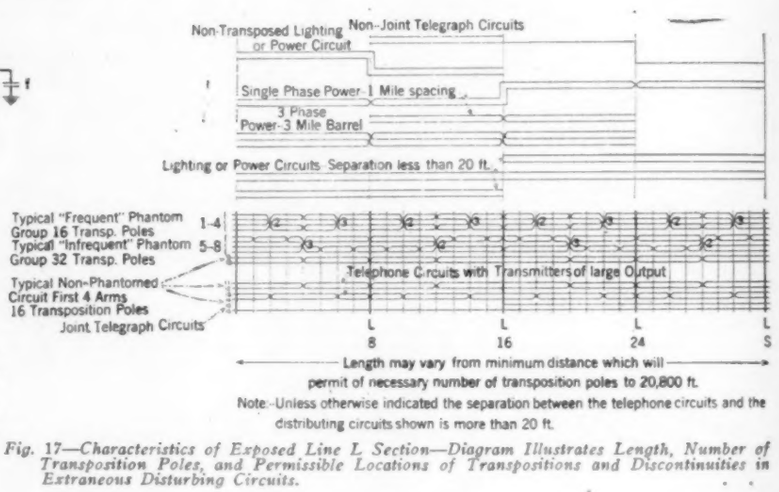
Case V. If at $x = O$,

$$W = \frac{v_1}{i_1},$$

then $$W = \sqrt{A\,B}$$

and

$$v_2 = E_1 \frac{2\,\sqrt{B} - \sqrt{A}}{2\,\sqrt{B} + \sqrt{A}} \tag{19}$$


Non-Transposed Lighting or Power Circuit
Non-Joint Telegraph Circuits
Single Phase Power-1 Mile spacing
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Joint Telegraph Circuits
Telephone Circuits with Transmitters of large Output
L 8
L 16
L 24
L S
Length may vary from minimum distance which will permit of necessary number of transposition poles to 20,800 ft.
Note.-Unless otherwise indicated the separation between the telephone circuits and the distributing circuits shown is more than 20 ft.

Fig. 17—Characteristics of Exposed Line L Section—Diagram Illustrates Length, Number of Transposition Poles, and Permissible Locations of Transpositions and Discontinuities in Extraneous Disturbing Circuits.

This impedance, $\sqrt{A\,B}$, is

$$\sqrt{A\,B} = Z_o = z_o \sqrt{\left[1 - \left(\frac{M}{z}\right)^2\right]\left[1 - \left(\frac{y_N}{y}\right)^2\right]} \tag{20}$$

Where $z_o = \sqrt{\frac{z\,y}{y^2 - y_m^2}}$ = the infinite line impe-

d[illegible] (13) single wire.

Case VI. At a long distance from the origin,

$$v_1 = v_2 = \frac{E_1\,\epsilon^{-\gamma p z}}{2} \text{ if } W = O \tag{21}$$

Also $v_1 = v_2 = E_1 \frac{4\,B}{A + 4\,B}\,\epsilon^{-\gamma p z}$ if $W = \infty$ (22)

It will be noted that the voltages on the disturbed and disturbing wires tend to become equal at a considerable distance from the origin, and that the two expressions for v_1 and v_2 with maximum and with minimum shielding are nearly the same.

APPENDIX C.—TYPE UNBALANCE BETWEEN TRANSPOSED TELEPHONE CIRCUITS

The induction between long transposed telephone circuits on the same lead is the vector sum of the induction between all short elements of the circuits, taking into

account the attenuation and phase change of the inducing currents and voltages from the transmitting point, and the attenuation and phase change of the induced currents in their propagation to the end of the circuit from the point at which the inductive effect occurs.

A simple typical arrangement of transpositions between two telephone circuits in a short balanced section is indicated in Fig. 23 in which similar telephone circuits P and Q are divided into four sections of lengths A, B, C, D by the transpositions in the two circuits. The resulting induction between the two circuits in this section is the sum of two terms:

a. Unbalance Due to Irregularity in Length. As this is a short section of line, one may consider as a first approximation that the current and voltage in the inducing circuit P are the same throughout this section. Currents induced in sections B and D, therefore, tend to neutralize currents induced in sections A and C, provided the length $A + C$ is equal to the length $B + D$. When this is not the case there is a resultant induced current in circuit Q due to irregularities approximately proportional to the resultant unbalanced length $A - B + C - D$.

b. Type Unbalance. If lengths A, B, C and D are all exactly equal there will nevertheless be a resultant induced current in circuit Q because of the fact that the currents and voltages in either circuit P or Q change in magnitude and phase as they are propagated along the circuit.

In this appendix are given equations illustrating the method of computing type unbalance.

If P is a section of a long telephone circuit the current and voltage in it can be represented by equations (23) and (24).

$$I = I_0 e^{-\alpha l} \sin (\beta l - w t) \qquad (23)$$

$$E = E_0 e^{-\alpha l} \sin (\beta l - w t) \qquad (24)$$

In these equations α and β are the attenuation constant and the phase-change constant of the telephone circuit and of course vary with the frequency of the current.

The induced current in a short element of circuit a distance L from the end of the circuit, can be represented as equation (25).

$$d X = K\, d l\, e^{-\alpha l} \sin (\beta l - w t) \qquad (25)$$

where $K\, d\, l$ is the induction between short elements at the end of the circuits and is computed with the help of equations (4) and (6) for the electromagnetic and electrostatic components. (Appendix A.) This induced current will be propagated on circuit Q back to the beginning of the circuit and under the condition for transmission without reflection, that is, terminal impedance equal to line impedance, will have when it reaches the beginning of the circuit, the value given in equation (26)

$$d X_0 = K\, d\, l\, e^{-2\alpha l} \sin (2\beta l - w t) \qquad (26)$$

A similar equation can be written for each element of the circuit. The induction due to length A is obtained by integrating expression (26) for the length between zero and A as shown in equation (27)

$$X_A = \int_0^A K\, d\, l\, e^{-2\alpha l} \sin (2\beta l - w t) \qquad (27)$$

The general expression for this integral is rather complicated. In practical telephone circuits, however, the effect of the attenuation in the short section of circuit between successive transpositions is very much less than the effect of the change in phase angle. Under these conditions the attenuation can be neglected for short lengths and the expression (27) reduces to that given in equation (28)

$$X_A = K A \frac{\sin \beta A}{\beta A} \Big/ \beta A \qquad (28)$$

Similarly, the crosstalk at the end of the circuit due to section B of the exposure between the lines can if B is equal in length to A be represented as in equation (29).

$$X_B = - K A \frac{\sin \beta A}{\beta A} e^{-2\alpha A} \Big/ 3\, \beta A \qquad (29)$$

In practical cases the ratio $\frac{\sin \beta A}{\beta A}$ is practically unity and the exponential expression $e^{-2\alpha A}$ is also practically unity. Under these conditions the induced current at the end of the circuit caused by sections A and B of the parallel can be represented approximately as in equation (30).

$$X_{AB} = 2 K A \sin \beta A \Big/ 2\, \beta A - \pi/2 \qquad (30)$$

Similarly, the resultant induction in circuit Q from sections A, B, C and D can be represented as in equation (31)

$$X_{AD} = 4 K A \sin \beta A \cos 2\, \beta A \Big/ 4\, \beta A - \pi/2 \qquad (31)$$

This simple example corresponds to one of the typical arrangements of transpositions, namely, that denoted by M in Fig. 2. A similar equation can be worked out for each typical arrangement, and numerical values worked out for any given values of β and A.

For much work a sufficiently good approximation can be made in the formulas for type unbalance by assuming that

$$\sin n \beta A = n \beta A$$

$$\cos n \beta A = 1$$

The resulting simple formulae give an easy means of judging of the approximate relative effectiveness of different arrangements. They are given for different typical arrangements under the heading *Approximate Formulas* in Fig. 2. When X represents the phase change per mile these formulas represent numerically the type unbalance for a 12.8 km. (8 mile) section. The angles of the type unbalance for different types of the same length differ only by 90 deg. or multiples of 90 deg., and these differences only are indicated in the approximate formulas.

The type unbalance varies, of course, with the frequency. In the design of telephone transpositions type unbalances are computed for a frequency found to represent the average crosstalk effect.

It remains to point out the relation between resultant unbalance due to type for a long length of line and type unbalance for one transposition section. Considering current of a single frequency, the ratio between these two for N sections is

$$\frac{1 - e^{-2N\gamma L_0}}{1 - e^{-2\gamma L_0}} \qquad (32)$$

Where L_0 is the length of the section.

Equation (32) assumes that the wires have the same relative pin positions at the beginning of each section. If the pin positions are the same in alternate sections and the opposite in successive sections formula (32) becomes

$$2 \sin \beta L_0 \frac{1 - e^{2N\gamma L_0}}{1 - e^{-4\gamma L_0}} \qquad (33)$$

For a large number of sections, and for the attenuations prevailing on good telephone toll lines equations (32) and (33) become approximately

$$\frac{1}{2\, \gamma\, L_0} \qquad (34)$$

and

$$\frac{\sin \beta L_0}{2\, \gamma\, L_0} \qquad (35)$$

Actually, result, obtained by these simple formulas must be corrected for the fact that the telephone current is a compound of currents of different frequencies, for which the values of β and γ are different. In the case of loaded lines a correction can be made rather simply. The change in phase angle from one loading section to another is large and varies widely for different components of the telephone current. Good results are therefore obtained by assuming that the effects of successive sections add together by a root-sum-square law. The resulting ratio between long line unbalance and type unbalance for a single section is

$$\sqrt{\frac{1 - \epsilon^{-4N\alpha L_o}}{1 - \epsilon^{-4\alpha L_o}}} \qquad (36)$$

Since N is large and αL_o small, this becomes approximately

$$\frac{1}{2\sqrt{L\alpha L_o}} \qquad (37)$$

APPENDIX D.—FORMULAS FOR TYPE UNBALANCE IN PHANTOMED CIRCUITS

Under the heading, *Phantom Circuits*, in the paper it is pointed out that the use of phantoms intelephone line construction complicates the computation of type unbalance because each transposition of a phantom circuit interchanges the pin positions of its two side circuits and, therefore, changes the coefficients of induction between these and other circuits.

The equations for computing the resultant induction per section due to type unbalance are given below. These equations are given for the case in which a typical arrangement of transpositions is associated with each side circuit of the phantom independent of its interchange of pin positions with the other side circuit of the phantom. This is the arrangement which has been found most suitable for use in the exposed line transposition system. Transposition systems can be designed with a typical arrangement associated with the wires on a given pair of pin positions. With this arrangement, each side circuit of the phantom is transposed partly in accordance with one typical arrangement and partly in accordance with another as it changes from one pair of pin positions to the other with transpositions of the phantom circuit. Under some conditions, this arrangement has advantages in the economy of retransposing non-phantomed circuits to form phantoms. It is used in the transposition system which is standard with the Bell Telephone Companies for non-exposed lines.

The formulas for the resultant induction per section due to type unbalance are as follows:

Suppose two circuits, *1* and *2*, to be combined in a phantom R and two circuits, *3* and *4*, to be combined in a circuit Q.

Denote by T_1, T_2, T_R, etc., the type unbalances corresponding to the typical arrangements of transpositions on circuits *1*, *2*, R, etc. Further let K_{1R}, K_{2R}, etc., represent the induction per unit untransposed length between circuits *1* and R, between circuits *2* and R, etc.

For Side Circuit to Phantom of Which it is a Part:

$$X_{1R} = S\,T_{1R} + D\,T_1 \qquad (38)$$
$$X_{2R} = S\,T_{2R} - D\,T_2 \qquad (39)$$

Where $S = \dfrac{K_{1R} + K_{2R}}{2}$

$$D = \frac{K_{1R} - K_{2R}}{2}$$

T_{1R} represents the type unbalance for the typical arrangement corresponding to the relative exposure between type *1* and type R.

T_R is similarly defined.

For Side Circuit to a Non-phantomed Circuit or a Phantom Other Than its Own:

$$X_{1Q} = S\,T_{1Q} + D\,T_{1RQ} \qquad (40)$$
$$X_{2Q} = S\,T_{2Q} - D\,T_{2RQ} \qquad (41)$$

When $S = \dfrac{K_{1Q} + K_{2Q}}{2}$

$$D = \frac{K_{1Q} - K_{2Q}}{2}$$

The nomenclature is the same as before.

T_{1RQ} represents the type unbalance corresponding to the relative exposure between the arrangement giving unbalance T_{1R} and typical arrangement Q.

For example, ifcircuit *1* is transposed to Type A
" R " " F
" Q " " L

$T_{1RQ} = T_{(AF)L} = T_{KL} = T_o$

That is, T_{1RQ} is in this case the type factor for arrangement O, which is obtained by combining successively types A, F, and L.

For the Two Side Circuits of a Phantom:

$$X_{12} = K_{12}\,T_{12} \qquad (42)$$

For Side Circuits in Two Different Phantoms:

$$X_{13} = S\,T_{13} + D_a\,T_{13R} + D_b\,T_{13Q} + D_c\,T_{13RQ} \qquad (43)$$
$$X_{14} = S\,T_{14} + D_a\,T_{14R} - D_b\,T_{14Q} - D_c\,T_{14RQ} \qquad (44)$$
$$X_{24} = S\,T_{24} - D_a\,T_{24R} - D_b\,T_{24Q} + D_c\,T_{24RQ} \qquad (45)$$
$$X_{23} = S\,T_{23} - D_a\,T_{23R} + D_b\,T_{23Q} - D_c\,T_{23RQ} \qquad (46)$$

Where

$$S = \frac{K_{13} + K_{14} + K_{24} + K_{23}}{4}$$

$$D_a = \frac{K_{13} + K_{14} - K_{24} - K_{23}}{4}$$

$$D_a = \frac{K_{13} - K_{14} - K_{24} + K_{23}}{4}$$

$$D_a = \frac{K_{13} - K_{14} + K_{24} - K_{23}}{4}$$

In the above equations the nomenclature is as before.

T_{13RQ} denotes the type unbalance corresponding to the relative exposure between the types giving type unbalances of T_{13} and T_{RQ}.

The D terms in the above equations are generally not negligible compared with the S terms. This fact requires that in designing, for example, transpositions between side circuits in two different phantoms, it is necessary to take account not only of the type unbalance of the relative exposure between the two circuits, but also of type unbalances formed by building up combinations of the typical arrangements of transpositions on the two side circuits and on the phantoms of which they form a part.

European Telephone Practice

Translations from the Foreign Press and Communications from European Engineers

THEORY of the Telephone— *(continued). Study of the Field of Resonance of the Telephone:*—To obtain the field of resonance of the telephone, it is sufficient to study the variations of energy absorbed by the diaphragm T, which vibrates of course, and to consider it as a function of the applied frequency ω. The vector method however does not lend itself readily to this discussion and it is necessary for us to work out the calculations and to solve the system of equations which we obtained.

BY FRED W. SCHOLZ

In those cases where we take account of the losses in the iron, this calculation is rather laborious. We are going to develop it only for the case where we do not have to take account of these losses, in other words, we will neglect the action of hysteresis and of the Foucault currents.

Qualitatively, the results are always the same, or in other words, the general trend of the curve of resonance of the telephone is not essentially modified by the fact that a certain amount of energy is or is not absorbed in the iron by hysteresis and by Foucault currents.

If we neglect the effects of retardation due to the Foucault currents and to hysteresis, the formula of Hopkinson will give us equation (6) without changes. This means that the vector Φ is in phase with the resultant of the magnetomotive forces. We will then have to solve the system:

$$\Phi = \left(\frac{4\pi n}{R_0}\right) i + 2\left(\frac{4\pi T}{R_0}\right) x \qquad (6)$$

$$ri + n\,\frac{\delta\Phi}{\delta t} = V_0 \sin \omega t \qquad (10)$$

$$M\frac{\delta^2 x}{\delta t^2} + A\,\frac{\delta x}{\delta t} + Cx = 2T\Phi \qquad (14)$$

which, in taking into account equation (6) is reduced to two equations, Φ having disappeared as an auxiliary variable, as also its derivative:

$$ri + \left(\frac{4\pi n^2}{R_0}\right)\frac{\delta i}{\delta t} + 2\left(\frac{4\pi nT}{R_0}\right)\frac{\delta x}{\delta t} = V_0 \sin \omega t \qquad (17)$$

$$M\frac{\delta^2 x}{\delta t^2} + A\,\frac{\delta x}{\delta t} + \left(C - \frac{16\pi T^2}{R_0}\right)x = 2\left(\frac{4\pi nT}{R_0}\right) i. \qquad (18)$$

Let us now shorten the equation to read: $\left(\frac{4\pi n^2}{R_0}\right) = l$

(We recognize here the coefficient of self induction of the coils.)

$$\left(\frac{4\pi nT}{R_0}\right) = m$$

$$\left(\frac{16\pi T^2}{R_0}\right) = B, \text{ and } (C - B) = D.$$

The system (17) and (18) can be written as:

$$ri + l\,\frac{\delta i}{\delta t} + 2m\,\frac{\delta x}{\delta t} = V_0 \sin \omega t \qquad (17)$$

$$M\frac{\delta^2 x}{\delta t^2} + A\,\frac{\delta x}{\delta t} + Dx = 2mi. \qquad (18)$$

The equation (18) shows that the vibrating diaphragm is acted upon by an external force $2mi$, and that its resultant elastic coefficient is not equal to C any more, as when vibrating alone, but rather to:

$$D = \left(C - \frac{16\pi T^2}{R_0}\right)$$

owing to the presence of the magnet.

It is necessary to consider the physical importance of this fact. Let us suppose to this end, that we can vary the point of support of the diaphragm in relation to the magnet, and let us represent by a curve (Fig. 5) the force of attraction of the magnet upon the diaphragm, as a function of the air gap x, the magnet being supposedly placed at O. We will have a hyperbolic curve of the third degree, which is asymptotic at Ox. As to the elastic reaction of the diaphragm, it will be represented by a straight line, more or less inclined towards the axis Ox, and cutting the axis of x at a point X_0, so that the distance OX_0 represents the distance of the magnet to the points of support of the diaphragm.

There will be a position of equilibrium of the diaphragm as related to the magnet, if the straight line encounters the hyperbola; at N it will be stable, at M unstable.

The coefficient C is also numerically equal to the angular coefficient of the straight line and the factor: $B = \frac{16\pi T^2}{R_0}$ is equal to that of the tangent to the hyperbola at point N. We have then

$$\left.\begin{aligned} C &= tg\ \alpha \\ B = \frac{16\pi T^2}{R_0} &= tg\ \beta. \end{aligned}\right\} \qquad (19)$$

In order that the position of equilibrium be stable, that is to say, in order that the diaphragm be not "fixed" or locked with the magnet, we must always have:

$$\left.\begin{aligned} C &> \frac{16\pi T^2}{R_0} \quad \text{or} \quad C > B \\ tg\,\alpha &> x\ tg\ \beta. \end{aligned}\right\} \qquad (20)$$

The resultant elastic coefficient of the equation (18) D, which is always equal to $C - B$ can never be negative; that is, it can never be negative in a well regulated and well working telephone.

But it can be zero or very near zero and this is exactly the case in many telephones in actual practice. It is this factor which corresponds on the theoretical side to a telephone which has been regulated so as to give its maximum efficiency. · Experience has shown that the telephone is at its maximum degree of sensitiveness when the distance from the diaphragm to the magnet is just sufficient so that the former does not stick to the magnet. If we turn to the curves in Fig. 5, we will see that the first possible position of equilibrium which the diaphragm can take corresponds to point T, where the straight line MN runs tangent to the hyperbola. We have in this case:

$$tg\,\alpha = tg\ \beta \text{ or } C = B \quad \frac{16\pi T^2}{R_0} \quad \text{or} \quad D = O. \qquad (21)$$

It is only a limited case, for, as the diaphragm is called upon to vibrate, and as it must not stock to the magnet, it will be necessary to allow for a little margin. In other words, it is always essential that the attraction of the magnet be always more than balanced by the elastic reaction of the diaphragm. We need only remember, that in a well working telephone, C will surpass B very little, so that the coefficient D will always be very small as compared to C or to B. These remarks will be found useful in our discussion.

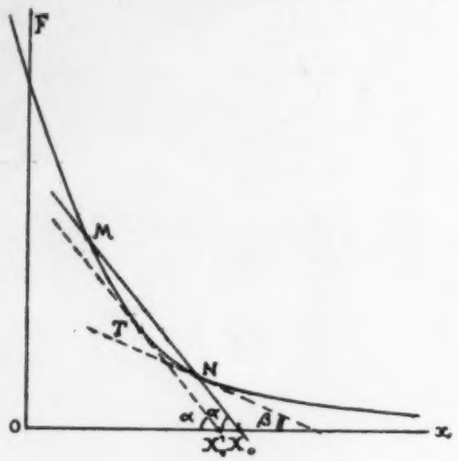

Fig. 5

For example we are required to solve the system of equations (17) and (18). We will obtain i and $\frac{\delta i}{\delta t}$ by differentiation from the equation (18). Then we will obtain $\frac{\delta x}{\delta t}$, $\frac{\delta^2 x}{\delta t^2}$ and $\frac{\delta^3 x}{\delta t^3}$ by successive differentiations from the equation (17) and we will carry the values found into equation (18). We will thus obtain the two following equations which contain only one single variable (equations (22) and (23)). In these equations the coefficient of $\frac{\delta x}{\delta t}$ or of $\frac{\delta i}{\delta t}$ is equal to: $(Dl + Ar + 4m^2)$. But on noting that $4m^2 = lB$, it will be reduced to: $(Cl + Ar)$ and we finally have:

$$(Ml)\frac{\delta^2 x}{\delta t^2} + (Mr+Al)\frac{\delta^2 x}{\delta t^2} + (Cl + Ar)\frac{\delta x}{\delta t} + (Dr)x = 2mV_0 \sin \omega t. \quad (22)$$

$$(Ml)\frac{\delta^3 i}{\delta t^3} + (Mr+Al)\frac{\delta^2 i}{\delta t^2} + (Cl + Ar)\frac{\delta i}{\delta t} + (Dr)i = V_0[(D - M\omega^2)\sin \omega t + A\omega \cos \omega t]. \quad (23)$$

These equations satisfy us for the integrals (24) and (25).

$$x = x_0 \sin(\omega t - \epsilon) \quad (24)$$

$$i = i_0 \sin(\omega t - \psi). \quad (25)$$

The general integrals are composed of (24) and (25), increased by the integral of equation (22) or (23) without a second member. This last integral common to (22) and to (23) is of the form:

$$Y = K_1 e^{v_1 t} + K_2 e^{v_2 t} + K_3 e^{v_3 t}, \quad (26)$$

in which V_1, V_2 and V_3 are the roots of the equation of the third degree:

$$(Ml)v^3 + (Mr + Al)v^2 + (Cl + Ar)v + (Dr) = 0 \quad (27)$$

which we can write in the form:

$$v^3 + av^2 + bv + c = 0. \quad (28)$$

We know that in order to obtain the roots of this equation, we start by removing the term of the second degree in placing:

$$v = z - \frac{a}{3}. \quad (29)$$

There remains to solve an equation of the form:

$$z^3 + pz + q = 0, \quad (30)$$

in which the roots are either all of them real (3 of them) or else two are imaginary and one real. However these roots may be, the roots of the equation (28) will be the form:

$$\left.\begin{aligned} v_1 &= z_1 - \frac{a}{3} \\ v_2 &= z_2 - \frac{a}{3} \\ v_3 &= z_3 - \frac{a}{3} \end{aligned}\right\} \quad (31)$$

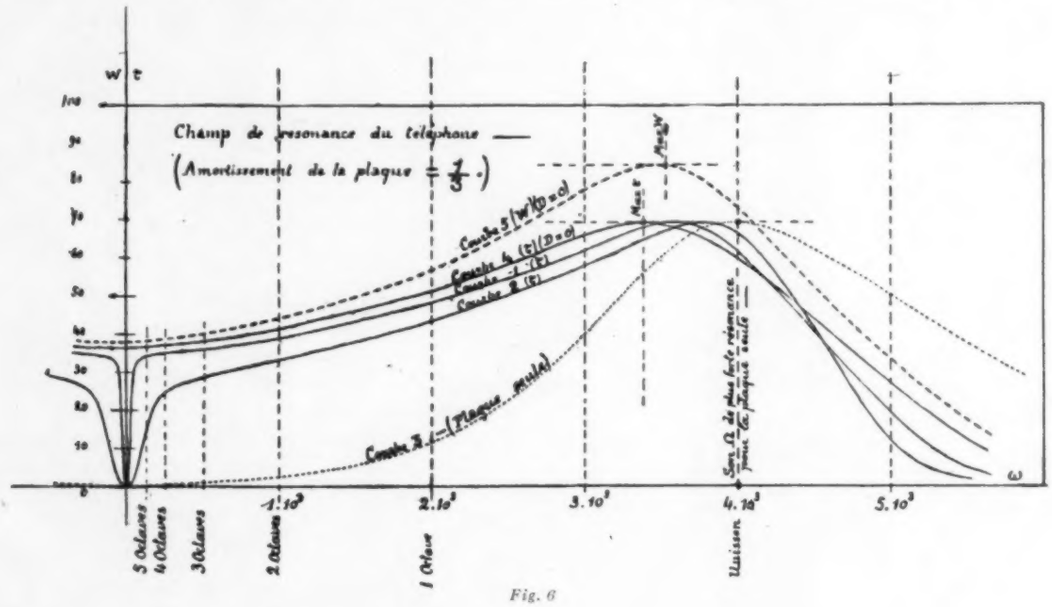

Fig. 6

z_1, z_2, z_3 designating the roots of the equation (30). The integral Y can then always be set up in the form:

$$Y = e^{-\frac{a}{3}t}\,[K_1 e^{z_1 t} + K_2 e^{z_2 t} + K_3 e^{z_3 t}]. \qquad (32)$$

Depending on the fact whether the roots z_1, z_2, z_3 are imaginary or real, the term between the brackets comprises some exponential functions of either real or imaginary exponents. We will have: at any one time an exponent and some sine and cosine functions or else nothing but exponents.

Now the term $e^{-\frac{a}{3}t}$ is always decreasing with time, for the factor $a = \left(\frac{r}{l} + \frac{A}{M}\right)$ is essentially positive. The product of the periodic functions of the bracket and of e–000 (if this exists) will then be zero for t (infinity); As for the product of the exponential functions of the bracket and of the term $e^{-\frac{a}{3}t}$, it can only be zero for t (infinity), for equation (28) has its real and positive coefficients and it cannot have a positive root; the positive values of z, if they exist, are always smaller than $\frac{a}{3}$.

We are now going to verify the equations (22) and (23) by the periodic equations (24) and (25) and will take out x and i. In order to shorten the equations, we will take:

$$\left.\begin{aligned}\rho &= [Dr - (Mr + Al)\omega^2]\\ \lambda &= [Cl + Ar - Ml\omega^2]\end{aligned}\right\} E = (D - M\omega^2) \qquad (33)$$

We have then:

$$\rho x_0 \sin(\omega t - \epsilon) + \lambda\omega x_0 \cos(\omega t - \epsilon) = 2mV_0 \sin\omega t. \qquad (34)$$

$$\rho i_0 \sin(\omega t - \psi) + \lambda\omega i_0 \cos(\omega t - \psi) = EV_0 \sin\omega t + A\omega V_0 \cos\omega t. \qquad (35)$$

From which we draw:

$$x_0 = V_0 \frac{2m}{\sqrt{\rho^2 + \lambda^2\omega^2}}, \qquad (36)$$

$$i_0 = V_0 \frac{\sqrt{E^2 + A^2\omega^2}}{\sqrt{\rho^2 + \lambda^2\omega^2}}, \qquad (37)$$

$$\cos\psi = \frac{E\rho + A\lambda\omega^2}{\sqrt{\rho^2 + \lambda^2\omega^2}\sqrt{E^2 + A^2\omega^2}}, \qquad (38)$$

$$\sin\epsilon = \frac{\lambda\omega}{\sqrt{\rho^2 + \lambda^2\omega^2}}, \qquad (39)$$

The impedance of the telephone J will then be:

$$J = \frac{\sqrt{\rho^2 + \lambda^2\omega^2}}{\sqrt{E^2 + A^2\omega^2}}.$$

We can then evaluate the energy τ absorbed by the diaphragm during a period, and reducing it to a unit of time, we have:

$$\tau = \frac{1}{T}\int_0^T 2mi\frac{\delta x}{\delta t}\,dt = mi_0\omega x_0 \sin(\epsilon - \psi)$$

$$\tau = V_0^2 \frac{2m^2 A\omega^2}{\rho^2 + \lambda^2\omega^2}. \qquad (40)$$

The total energy consumed during the same time W is:

$$W = \frac{1}{2} V_0 i_0 \cos\psi$$

$$W = \frac{1}{2} V_0^2 \frac{E\rho + A\lambda\omega^2}{\rho^2 + \lambda^2\omega^2}. \qquad (41)$$

The study of the variations of energy τ considered as a function of ω will furnish us with the resonance curve of the telephone, which we have called the "field of resonance" of the telephone. If we place τ in relation to the applied frequency ω, we can set:

$$\frac{r}{l} = \alpha, \qquad \frac{D}{M} = \Delta^2$$

$$\frac{A}{M} = a, \qquad \frac{C}{M} = \Omega^2$$

which is the frequency of the diaphragm for the sound called "its strongest resonance."

$$P = [a^2 + \alpha^2 - 2\Omega^2]$$

$$Q = [(\Omega^2 + a\alpha)^2 - 2\Delta^2\alpha(a + \alpha)]$$

$$T = \Delta^4\alpha^2.$$

τ can be written:

$$\tau = \frac{1}{2}\frac{B}{M}\frac{a}{l} V_0^2 \frac{\omega^2}{\omega_0 + P\omega^4 + Q\omega^2 + T}. \qquad (42)$$

If we use the values of ω as abscissae and those of τ as ordinates (Fig. 6) we obtain a curve of the seventh degree whose axis $O\tau$ is symmetrical and whose straight portion ($\omega > O$) has only a physical interest. These curves are tangents to the axes of ω. This curve is given by the limits of $\frac{2\tau}{\omega}$ for $\omega = O$. It is therefore equal to:

$$\frac{\frac{B}{M}\frac{a}{l} V_0^2}{T} = \frac{V_0^2 aM}{l\alpha^2}\,\frac{B}{D^2}.$$

In a well regulated telephone, that is, in one which has D very small as compared to C or B, the curve will always be great at the origin and for very small values of ω the curve will begin to grow very rapidly. This is indicated by curve 1 in Fig. 6, in which we have D equal to 1-10-C. When starting out from some certain value of ω, the curve grows much more slowly; it attains its maximum for a value of $\omega = \omega_m$, which does not coincide with the sound of the strongest resonance Ω of the diaphragm. Then the curve drops quickly and becomes asymptotic at $O\omega$. The characteristic of the functions τ is to attain quickly a very high value for relatively low frequencies and to show a certain uniformity between these frequencies and the maximum of resonance, even when the telephone is not very well regulated. We can obtain a good idea of the fundamental difference between the resonance curve of a telephone and that of its vibrating diaphragm alone by comparing the curves representing τ with the resonance curve of the diaphragm which has been traced in dotted outline in curve No. 3.

This curve 3 represents a vibrating diaphragm away from its magnet and has an equation equal to:

$$M\frac{\delta^2 x}{\delta t^2} + A\frac{\delta x}{\delta t} + Cx = F_0 \sin\omega t. \qquad (43)$$

If we suppose the telephone to be at its extreme limit of sensitiveness, that is, if we make D equal O, the equations are simpler and the value of τ is then:

$$\tau = \frac{1}{2}\frac{a}{l} V_0^2 \frac{\Omega^2}{\omega^4 + P\omega^2 + Q'} \qquad (44)$$

with: $Q' = (\Omega^2 + a\alpha)^2$.

In reality for $D = O$, the curve (42), whose curve at the origin approache sinfinity, is resolved into a curve of the fifth degree (44) and a double straight line $\omega^2 = O$, which is represented by the axis $O\tau$. The principal values of τ for $D = O$ (44) are then:

1. For $\omega = O$

$$\tau_0 = \tfrac{1}{2}\left(\frac{V_0^2}{r\left[\frac{A\alpha}{C} + 2 + \frac{C}{A\alpha}\right]}\right).$$

2. For $\omega = \Omega$

$$r_{\Omega} = \tfrac{1}{2}\left(\frac{V_0^2}{r\left[\frac{A\alpha}{C} + \frac{a}{a} + 2 + \frac{x}{a}\right]}\right).$$

3. Finally the maximum of r gives:

$$\omega = \sqrt{\Omega^2 - \tfrac{1}{2}(a^2 + \alpha^2)}$$

and its value is:

$$r_{max} = \tfrac{1}{2}\left(\frac{4\Omega^2}{4\Omega^2 - (a-\alpha)^2}\right)\frac{V_0^2}{r\left[\frac{a}{\alpha} + 2 + \frac{\alpha}{a}\right]}.$$

The energy consumed by the telephone W considered as a function of ω, is likewise a function of the seventh degree, but it differs from the function r, in that it never passes through the origin. The curve No. 5 in Fig. 6 represents the function W in the case where $D = O$, that is, the function:

$$W = \frac{1}{2}\frac{\alpha}{l} V_0^2 \frac{\omega^2 + U}{\omega^4 + P\omega^2 + Q'}, \qquad (45)$$

in which:

$$U = \frac{a}{\alpha}\left[\Omega^2 + a\alpha\right].$$

The principal values of W are then in this case: $(D = O)$

1. For $\omega = O$

$$W_0 = \frac{1}{2}\frac{V_0^2}{r + \frac{C}{A}l}.$$

2. When $\cos\Phi = 1$, W is not at its maximum and w have:

$$\omega_{(\cos\Phi = 1)} = \sqrt{\Omega^2 - a^2}$$

$$W_{(\cos\Phi = 1)} = \frac{1}{2}\frac{V_0^2}{r + al}.$$

3. The energy W resumes the same value

$$\left(\frac{1}{2}\frac{V_0^2}{r + al}\right) \quad \text{for:} \quad \omega = \sqrt{\Omega^2 + a\alpha} = \Omega_0$$

and this corresponds to a case where $\lambda = O$ as in equation (33).

4. For $\omega = \Omega$, W is not maximum.

5. The maximum of W is expressed by:

$$\omega = \sqrt{\Omega_0\left[\Omega - \frac{a}{\alpha}(\Omega_0 - \Omega)\right]}. \quad (\Omega_0 = \sqrt{\Omega^2 + a\alpha}).$$

$$W_{max} = \frac{1}{2}\left(\frac{\alpha^2}{\alpha^2 - (\Omega_0 - \Omega)^2}\right)\frac{V_0^2}{r + al},$$

The curves for Fig. 6 have been obtained for a case with the following values taken in C. G. S. units.

$$\left.\begin{matrix} M = 10 \\ C = 16.10^7 \end{matrix}\right\} \Omega = \sqrt{\frac{C}{M}} = 4.10^3.$$

$A = 3.10^4$, which corresponds to a relative weakening effect $\frac{A}{2M\Omega}$ about equal to 1-3, or

$$\left.\begin{matrix} r = 10^{10} \\ l = 4.10^7 \end{matrix}\right\} \left.\begin{matrix} n = 400 \\ T = 400 \end{matrix}\right\} R_0 = 0{,}05.$$

(To be concluded.)—L'Industrie Electrique.

The Telephone-Relays Used In France

IN its effort to standardize telephone equipment, the French department of telegraphs and telephones has worked out the design of telephone relays or repeaters, which have been tested in practice on the Paris-Marseilles line, which especially during the war had to stand a great deal of traffic. The results of the tests were so satisfactory that the French department is contemplating using these relays on all the French lines.

Under the term relay, the French understand all kinds of telephone apparatus whose duty it is to amplify and strengthen telephone currents. One can almost say that the word existed long before the object itself did, for as long as one knew only the mechanical relay, composed of a telephone receiver working upon a microphone, the telephone relay was practically non-existant. It was only since the invention of a vacuum tube carrying three electrodes that amplification of telephone currents became commercially possible. The action of these lamps with three electrodes is too well known to need any special discussion.

A telephone relay comprises essentially these things: on the one hand, one or more of these lamps, conveniently placed and forming the amplifier, and on the other hand a certain number of accessories, needed to obtain the reversibility of the system; that is to say, allowing conversation to be carried on in both directions on the telephone line under consideration.

Amplifiers: The lamps with three electrodes used by the French department were worked out in conjunction with the wireless department of the army and navy. The amplifier has two stages of amplification. It carries two lamps mounted in series as is shown by Fig. 1.

The two plates P and P' are brought to a positive potential of 96 volts by a storage battery. On a well insulated line one can obtain the same effect of increased telephone currents with a battery of 48 volts. The filaments in the lamps are heated by a battery of cells of 6 volts. This heating is done by way of a rheostat R, which is regulated so as to obtain about 4 volts between the ends of the wire. Three sets of cells are required to have a constant current at 4 volts. Finally the two plates are connected with the negative pole of this heating battery.

Mounting of the Relay: The amplifier is installed in the telephone line at a point between the two extreme telephone stations and somewhat near the center of the telephone line to be strengthened. The manner of mounting is shown in Fig. 2.

The coils *1*, *2*, *3*, *4* and *5* constitute what might be called a transformer. The telephone currents pass into the amplifier through the winding *5* and pass out, after amplification, through the coil *6* and reach the telephone line by way of coil *7*.

The condensers C_1 and C_2 of 4 microfarads prevent the signal current (direct, or alternating current of low frequency) from being weakened too much by the presence of the winding *7* which is shunted into the line. The transformer coils *1*, *2*, *3*, *4*, *5* offer an impedance to the current which amounts to about 300 ohms for 25 periods.

If this telephone line just considered is combined with another telephone line, the windings *1*, *2*, *3* and *4* are traversed by the current in parallel. Under these conditions they offer an impedance to the current of only 9 to 10 ohms. It is also possible to provide only one of the two telephone lines used with a relay without causing any unbalancing effect by this action.

Lighting and Extinguishing Lamps: Either one of the two operators at the extreme end telephone stations between which the line is run can light or extinguish the lamps by using a signaling current prolonged beyond the normal duration of call currents and cut-off currents.

Between *A* and *B* (Fig. 2) there is shunted an electromagnet of the type used in cut-off relays. The electromagnet *F* (Fig. 3) offers a strong impedance to telephone currents. Its armature, when attracted, closes a circuit including the battery of 96 volts. The current of this battery circulates then within the electromagnet *R* whose action upon its armature is retarded by a dash pot, which acts like a small glycerin seal. The spring *T* is slowly started towards the upper portion of the figure,

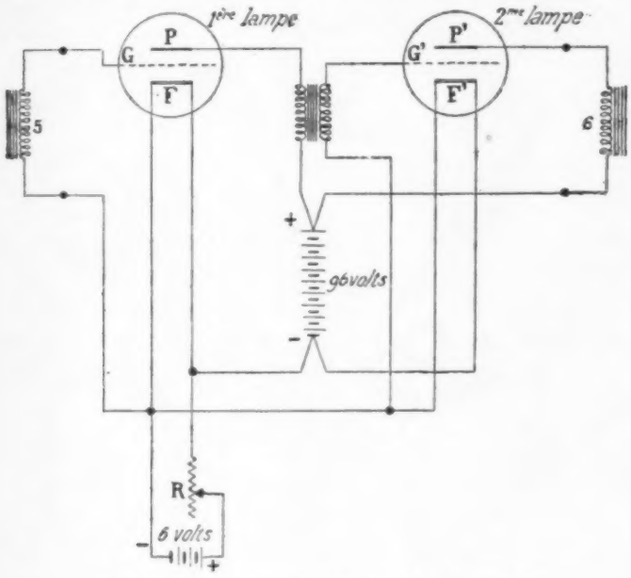

Fig. 1—French Current Amplifiers for Telephone Work.

and closes the contacts *1* and *2* in succession. The first contact is closed after sufficient time to count slowly to 5 and the second after time enough to count slowly to 20.

The role of contact *2* will be shown later. When the spring *T* has closed the contact *1*, the current from the 96 volt battery passes into the coils of an electromagnet whose armature operates a cam *C*. This cam plays the same role as a switch used for turning on the electric light. It lights the two lamps of the relay when the latter are extinguished, and extinguishes them when they are lighted.

In the morning, the first operator at the exchange who has to use the line calls her fellow operator, sending her a current of a duration of time equal to that necessary to count slowly to 5. This maneuver lights the lamps and calls the operator at the other end. Then, during the entire period of time that conversation is carried on, the calls and the closing signals will have to be brief. The rod *T* is never displaced enough to touch the contact *1*, nor for that matter *2* either. The relay lamps remain lighted. When either of the two operators has no further need of the long distance line, she extinguishes the lamps by the same maneuver that she used to light them.

Control of Lamps: It is necessary that the operator try and see whether she really has extinguished the lamps, or in other words, that she has sent out current of a long enough duration to do this. She is warned by the sound

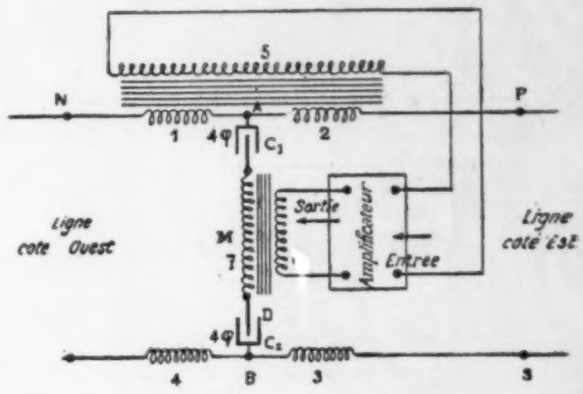

Fig. 2—Setting up Telephone Relays.

produced by a small buzzer, which works with as small a difference of potential as 6 volts, furnished by the heating battery. The operator hears the same buzzing noise if she has sent too short a current into the line. Moreover in this latter case the feebleness of the sounds transmitted by the telephone gives her the same warning. Either one of the extreme exchanges can call the intermediate one where the relays are installed by sending to it a current equal in time duration to sufficient time to count 20. The spring *T* will then close the contact *2* which results in sending the current from the heating battery into an ordinary annunciator of 200 ohms.

Automatic Warning of Trouble: To a polarized annunciator of the type approved by the French department, whose normal winding is the winding *E* in Fig. 4, is added a second coil *E'* with somewhat smaller coils.

The coils are connected in such a way that when the two lamps are lighted, the magetizing effects of the two coils are neutralized. When either of the two lamps refuses to function, the coil *E* produces a strong effect and the annunciator works and notifies the operator. It is necessary to make use of a polarized annunciator. As a matter of fact, at the moment of lighting the lamps, when the filaments are yet cold and when they are consequently of much less resistance than in the normal lighted condition, the current taken by the lamps is very intense. If then the annunciator were not polarized, it would function at this time through the excess of current in the winding *E'*. With a polarized annunciator, conveniently in-

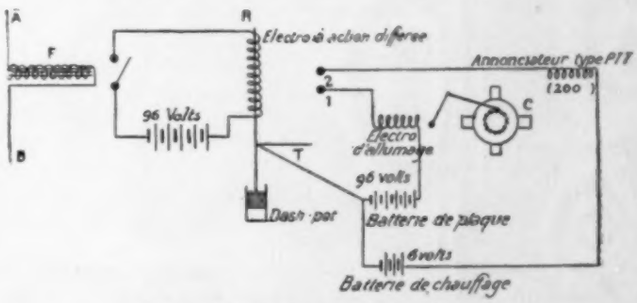

Fig. 3—Lighting and Extinguishing Lamps.

stalled, this surplus of current in *E'* has no effect on the armature.

Watching the Operation of Relays: By dropping a certain key, the intermediate station can immediately

shunt itself between *M* and *D* (Fig. 2). It can thus not only watch over the operation of the relays, but can even interfere in a conversation. For this station thus shunted into the line enjoys the two following properties: The

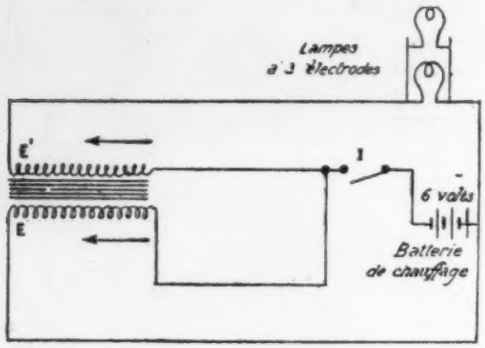

Fig. 4—Automatic Warning Signal.

operator at the station in question receives the currents strengthened by the relays, while the currents sent out by its microphone are sent on without amplification over the two sections of the line. A very simple switching arrangement permits the intermediate station to cut the relay out of the circuit and to connect the two sections of line directly with each other.

Compensating Resistance: Two variable resistances, called by the French compensating resistances, are used. The first one is shunted between *N* and *P* (Fig. 2) and the second shunted bweteen *Q* and *S*. These are to to lessen the unbalancing effects of the impedance between the first and second section of the line. They act in this way: If the impedances of the two sections of the line are equal, *N* and *P* on the one side and *Q* and *S* on the other side are of the same potential and no current passing from the amplifier will pass over the compensating resistances. But when the impedances of the two sections become unequal, a portion of the amplified current passes into the compensating resistances, which, by decreasing the strengthening effect of the relays, prevents auto-excitation of the relay.

Signaling: The signal currents pass through the windings of the relays without great weakening effect; in almost all cases they reach the extreme exchanges with sufficient strength. When the calls become too feeble, a call sender similar to that used in telegraph work is installed at the relay station. The four wires are then cut into by the 4 microfarad capacities at the entrance into the relays and four electromagnets similar to those used in telephone practice assure the transmission of the signal calls. The necessary current for this is furnished by the call current generator at the intermediate station. —*Annales des Telegraphes et Telephones.*

First Class-B Contract

The Petroleum Telephone Company at Oil City, Pa., is said to be the first Class-B company to take up the matter of compensation with the government and receive a satisfactory contract.

By the terms of this agreement the government guarantees to the company an amount sufficient to pay interest on the bonds and to continue paying seven per cent dividends on the common stock. The government also agrees to set up depreciation accounts at the rate of $24,000 a year. This makes a total of about $75,000 a year.

"Disinfecting" the Telephone

Even a scare like the recent influenza epidemic has its occasional gleams of humor.

One of these funny incidents was staged in a suburban city, where a subscriber who had read something about the possible dissemination of germs by the use of the telephone, planned and executed a highly original disinfection scheme of her own. Her mental disquietude was caused by a neighbor who had no telephone, but who wanted to telephone the doctor. The subscriber graciously granted the use of her instrument. At the conclusion of the talk, the neighbor announced that she had been telling her doctor how she felt and that the doctor had said she had symptoms of influenza and had ordered her to go to bed at once. The subscriber thereupon decided that the telephone instrument was an element of danger, and, knowing that hot water was a good disinfectant, she placed it, stand and all, in a pan of the aforesaid water, which she placed on the table. A half hour or so afterward a plant employe knocked at the door and asked her if her telephone wasn't out of order. She replied

"I thought this would kill any germs," explained the subscriber.

in the negative and invited him in to make an inspection. "I thought this would kill any germs," explained the subscriber, pointing to the telephone instrument, drowned in the dishpan.

"I don't know about killing the germs," said the plant man, "but it certainly killed your telephone service."

Illinois Convention December 10

The fourteenth annual convention of the Illinois Independent Telephone Association, which was to have been held at the Jefferson hotel November 6, 7, and 8 and was postponed because of the influenza situation, will be held there on December 10, 11 and 12, according to announcements made by the convention bureau of the Peoria Association of Commerce. Practically the same program will be followed that was arranged for the original date.

BY HERBERT S. HOUSTON

Member of the Chamber of Commerce of the U. S. A. on Economic Results of the War

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Chapter XVIII—(Concluded)—The New Day After the War

THIS leaves the third change that may follow the war to be examined. And that stands midway between the two extremes of imperialism and radicalism. It can be stated, broadly, in this fashion:

3. *Representative democracy existing in nations and serving as a bond of union in a league of nations.*

This is an approximately accurate description of the political principles of the Entente Allies in the war. With the exception of Japan, whose government has been steadily becoming more democratic since 1868, each of them has a government directly responsive and responsible to the people. And this fact has been a controlling factor in bringing them together and in holding them together in a league. It has made sharp and clear-cut the battle line between democracy and autocracy and thus has determined the decisive purpose of the war. Now democracy is not socialism. It stands for the individual, for his initiative, for his rights, for his freedom. Democracy is the creed of the Gospel, for it interprets the underlying and unescapable obligation in personal responsibility. Germany forgot her Luther or she could never have forged such a thunderbolt as Prussian militarism. But the printing press which her Gutenberg set up in Mainz has served as a mighty instrument of democracy. It made possible the spread of knowledge, which has been both the cause and the hope of modern civilization. The printing press has been the screw of Archimedes that everywhere has been lifting men into a consciousness of their manhood. Serfdom has had to go, slavery has had to go, feudalism has had to go—and democracy, based on the rights of man, had to come. And in all the centuries it has been coming, slowly, oh very slowly at times, but coming, surely coming. It has been coming in Germany through the growing rise of the people's power; in England, through the revolution in which the inherited power of the lords has been shattered and the supreme power of the people recognized; in all modern Europe it has been coming; in Turkey, in Persia, in China it has been coming; in America, it has been coming.

Vested power will entrench itself in many strong positions in the generations to come, as it has in the past, but it must lose them because its fight is against men and women who are being raised by the democratic power of the printing press into reliant, strong, conscious individualism. When the printing press gave knowledge to the world it gave the power to the world that was to make it democratic. Learning was no longer the privilege of the few but the possession of the many. The Bible was no longer chained to cathedral pulpits but found its way into the humblest home. Government was no longer vested in kings, and though thrones might remain, they have become merely symbols of a power transferred in increasing measure to the people. The world had to be democratized.

The great war itself has been an agency of democracy. It is unbelievable that the millions who have fought it, on the firing lines and behind them, can be brought under subjection to autocracy. It may be believable, but it doesn't appear to be probable, that they will carry democracy to the point of extreme radicalism. Instead, it is more reasonable to look forward to a world after the war in which democracy will be truly representative, controlling governments within nations and serving as a bond of understanding and union between nations in a League to Enforce a just and durable Peace.

Appendix I*—Proposals of the League to Enforce Peace

WE believe it to be desirable for the United States to join a league of nations binding the signatories to the following:

First: All justiciable questions arising between the signatory powers, not settled by negotiation, shall, subject to the limitations of treaties, be submitted to a judicial tribunal for hearing and judgment, both upon the merits and upon any issue as to its jurisdiction of the question.

Second: All other questions arising between the signatories and not settled by negotiation, shall be submitted to a council of conciliation for hearing, consideration and recommendation.

Third: The signatory powers shall jointly use forthwith both their economic and military forces against any one of their number that goes to war, or commits acts of hostility, against another of the signatories before any question arising shall be submitted as provided in the foregoing.†

Fourth: Conferences between the signatory powers shall be held from time to time to formulate and codify rules of international law, which, unless some signatory shall signify its dissent within a stated period, shall thereafter govern in the decisions of the Judicial Tribunal mentioned in Article One.

*There are reprinted in the appendix the proposals of the League to Enforce Peace and Referendum Number Eleven and Referendum Number Twenty-three of the Chamber of Commerce of the United States, to all of which frequent references have been made.

†The following interpretation of Article 3 has been authorized by the Executive Committee:

"The signatory powers shall jointly employ diplomatic and economic pressure against any one of their number that threatens war against a fellow signatory without having first submitted its dispute for international inquiry, conciliation, arbitration or judicial hearing, and awaited a conclusion, or without having in good faith offered so to submit it. They shall follow this forthwith by the joint use of their military forces against that nation if it actually goes to war, or commits acts of hostility, against another of the signatories before any question arising shall be dealt with as provided in the foregoing."

Appendix II—Referendum Number Eleven

REPORT OF THE SPECIAL COMMITTEE ON RESULTS OF THE WAR AND AMERICAN BUSINESS—SEPTEMBER 2, 1915

TO the Board of Directors of the Chamber of Commerce of the United States:

All Americans are profoundly moved by the war, whether viewed from its moral or material aspects. Especially is this true of American business men who, through their business relations, are closely in touch with the actual conditions in Europe. Moreover, the knowledge that war fundamentally injures the business structure and the trained power of the successful business men to accomplish results has created in them the will for more lasting peace.

This will is not the creation of this war alone. United States business men had put such strength and efficiency into an International Chamber of Commerce that, in June, 1914, at Paris, the International Chamber of Commerce voted to submit a business question of international interest to a referendum, thus beginning the movement to develop a world-wide consensus of matured business opinion and to secure international agreement and legislation on disputed, wrongly settled, or unsettled commercial questions. As the membership reached in this interchange of views included the representatives of almost every business men's association in every important commercial country in the world, and as commerce and markets underlie many of the more talked of "causes of the war," it is clear that the business men of the United States were, before the present war, working in the right direction for more lasting peace.

HISTORICAL STATEMENT

At the last convention of the Chamber of Commerce of the United States, in Washington, in January, 1915, a resolution was offered by a delegate—the representative of the Advertising Clubs of America—urging that the power of international commerce and finance, applied as economic pressure, be employed to compel nations to bring their differences before an international tribunal before going to war.

In 1907, at the Hague International Conference, forty-four of the civilized nations of the world agreed on the necessity of an international tribunal to deal with international differences.

In 1912, the International Congress of Chambers of Commerce, made up of delegates representing the principal organizations of business men of all civilized countries of the world, voted unanimously in favor of arbitration for the settlement of international disputes.

In the spring of 1915 your committee was appointed by the Directors of the Chamber of Commerce of the United States to examine into the relations between the present war and business and submit suggestions as to the future.

Accordingly your committee has studied the question carefully and canvassed many of the best minds in this country and in Europe. Early in June of this year a large number of representative business men and leaders in professional life met in Cleveland in a World's Court Congress. Some of your committee attended this meeting. Its sentiment was unanimous in recognition of the need of developing more definite law in international relations. To that end it declared strongly in favor of an international tribunal, with the support of international police power.

On June 17 your committee met in Philadelphia, concurrently with a meeting of distinguished Americans in Independence Hall, and participated as individuals in the meetings of the League to Enforce Peace. Here again the sentiment was overwhelming for the supremacy of law in the relations between nations, and the following resolutions were adopted:

First: All justiciable questions arising between the signatory powers not settled by negotiation, shall, subject to the limitations of treaties, be submitted to a judicial tribunal for hearing and judgment, both upon the merits and upon any issue as to its jurisdiction of the question.

Second: All other questions arising between the signatories and not settled by negotiation shall be submitted to a Council of Conciliation for hearing, consideration and recommendation.

Third: The signatory powers shall jointly use forthwith both their economic and military forces against any one of their number that goes to war, or commits acts of hostility, against another of the signatories before any question arising shall be submitted as provided in the foregoing.

Fourth: Conferences between the signatory powers shall be held from time to time to formulate and codify rules of international law, which, unless some signatory shall signify its dissent within a stated period, shall thereafter govern in the decisions of the Judicial Tribunal mentioned in Article One.

From a number of other countries come reports of similar meetings with similar expressions of opinions. Thus it became evident to your committee that the best thought of the world was nearing an agreement on what should be done better to safeguard the interests now subject to injury by war. This consensus of opinion was well expressed in a statement issued from a conservative source last June—one of our largest and most successful banks—which reads in part as follows:

"The occasion (of the sinking of the *Lusitania*) illustrates the want of the civilized world for a duly constituted authority for determining and defining international law under all the changing conditions of modern life and warfare. It may be that it is too much to hope for, that in this or near generations war can be altogether prevented; it may be that for a long time to come great racial and national impulses will occasionally break through all restraints that may be contrived and all agreements that individuals of passing authority may formulate and insist upon fighting out matters of fundamental concern. * * * The United States has always stood, as a matter of principle, for the broadest possible interpretation of the rights of neutrals and non-combatants in tide of war. This policy has been determined upon the theory that it is in the interest of civilization and for the good of mankind that the area of war operations shall be circumscribed as much as possible, and the rights of neutrals and non-combatants protected and enlarged. In time of peace this principle must command general approval, but in time of war, when nations are fighting, as they believe, for their existence, any change of conditions that may be held to affect the application of international law is seized upon by the combatants. The trouble then is that international law rests upon common consent, and there is not even a recognized authority to say what it is with relation to new conditions that arise. Private war, the settlement of property disputes by force, and of questions of honor by the duel, have been done away with by the creation of a body of law and the establishment of tribunals to try the causes that may arise. There is no humiliation or disgrace in submitting to the determination of a duly constituted court, even though the defeated party feels that justice in his case has not been done. The essential thing is that order shall be maintained and that rights shall be determined, not by the power of force, but by rules of equity impartially administered.

"In the international field there remains the risk that the parties to a dispute, jealous of their rights, fearful of the results of precedent, sensitive as to national honor, swayed by the emotions or interests of the hour, may take positions from which retreat upon either side seems to be impossible, and so drift into war, although neither side desires it. The civilized world is supremely interested in the maintenance of order; the first condition of this is good understanding, and nothing will contribute so much to it as an agreed method of determining what is right in cases of dispute according to principles accepted and defined so far as possible in time of peace."

As business men, we cannot fail to foresee that, if this war is settled as all previous wars have been, without providing for the "duly constituted authority," there will be added to its enormous charges the still greater continuous charges due to rivalry in armaments and other preparations for the "next settlement." Under such conditions, we are forced to believe that the European nations, after the war, will be faced with the insistent need for re-establishing their industries at almost any sacrifice in order to keep up in the race for armaments and to obtain means of settling their debts so as to keep their credit good for the next war. Predictions by students of affairs already abound that these necessities will cause them to make sacrifices of natural profits, lower their scale of living, and so create competition of unexampled severity—a competition which also would be particularly ominous for our high-wage market that so far has suffered least.

FACTORS TO BE FACED

Whether this reasoning be sound or not, the certain factors we have to face in the event of an unsatisfactory settlement in Europe will be:

1. A reduction of purchasing power in Europe and indirect reduction thereby of purchasing power in other countries; for instance, if Brazil cannot sell as much coffee to Europe her purchasing power in other countries will be proportionately limited.

2. A shortage of the world's available capital due, (a) to sheer destruction, (b) to the great uncertainty as to the future, (c) to the need for settling certain of the war debts, and (d) preparing for further war—the whole tending to raise the price of capital the world over and limit notably its employment in the newer countries.

3. A decline in the European standard of living and perhaps

of wages, rendering possible a low-priced production, which will create a costly world-wide disturbance of industrial conditions.

4. Increasing hostile protective tariffs on the part of the fighting countries, due, first to a desire to find a source of taxation, and secondly to the desire to make the country imposing it as self-sufficing as possible in manufactures and food, as a military measure.

Should a period of unrest and uncertainty follow an unsettling "settlement," the United States will not be free to determine what increase, if any, she will make in her armaments, but may be forced into an abnormally great increase with correspondingly abnormal tax and other burdens.

The possibility of a growing revolutionary spirit in Europe, due to a very seriously increased burdens on the masses, with reactions on certain sections of American labor, is not to be disregarded.

FIVE SPECIFIC PROPOSALS

In any case it is obvious that America will be very seriously affected by the character of the settlement arrived at in Europe. Your committee, therefore, favors calling upon Congress and the President to do all in their power to promote the establishment of:

1. A More Comprehensive and Better Defined Sea Law.
2. An International Court.
3. A Council of Conciliation.
4. International Conferences for the better establishment and progressive amendment of international law.
5. The organization of a System of Commercial and Financial Non-Intercourse to be followed by military force if necessary, to be applied to those nations entering into the foregoing arrangements and then going to war without first submitting their differences to an agreed upon tribunal.

RECOMMENDATION ONE

A More Comprehensive and Better-Defined Sea Law.

At best, sea law during war has always been poorly defined. Many of the causes of friction between belligerents and neutrals have been due not so much to wilful disregard by belligerents of neutral rights as to honest differences in appraising them. The understandings of one period have become confused by new inventions, new conditions. The international conferences which from time to time have undertaken more clearly to bring the nations into agreement respecting the rights of persons and property at sea have met irregularly, and their recommendations have had no binding force. There is need of a legislative body to frame agreements on such law; there is need of just interpretation of this sea law, which means an international court; there is need of a method of compelling respect for the court's decision, which means finding something better as a way of enforcing international law than taking sides in a war in which both sides may be violating the law. The present war with the losses of lives and property of Americans has fundamentally emphasized these needs.

RECOMMENDATION TWO

An International Court.

When citizens disagree, the state provides courts to mete out justice. When two or more of our states or of citizens in different states disagree, the United States maintains courts for the same purpose. It is no more logical or right for nations with differences to resort at once to war than it would be for two men who have failed to settle a private difference to draw pistols and begin to shoot.

The problem of securing peace and justice among nations is simply an extension of what we have successfully solved in the national and municipal realms. It is not without significance in this connection that forty-four of the principal nations of the world had, seven years before the war, agreed in principle to the establishment of a World's Court of Arbitral Justice, differing only over details. Since 1907, however, there has been much study of details, and with the compulsion of the experience of this war added it is now believed that the difficulties they presented can more readily be overcome.

RECOMMENDATION THREE

A Council of Conciliation.

There are questions that cannot be decided by the strict rule of law. Among nations questions of honor and questions of policy are usually reserved from arbitration. We should not, for example, arbitrate the Monroe Doctrine or submit to a court our right to say whether or not we might exclude or restrict immigration. But before nations shall fight over such questions, bringing damage on all, it is fair to neutrals that they should be given a chance to ascertain the facts and, if possible, help to a peaceful solution. The delay incident to such efforts toward conciliation may serve as a preventive of war.

RECOMMENDATION FOUR

International Conferences for the Better Establishment and Progressive Amendment of International Law.

Along many lines already world forces have been working for many years through international conferences to promote a better understanding among nations, establish more firmly enlightened standards to govern their inter-relations and furnish a body of international law.

A number of general conferences were started by international meetings before the nineteenth century, but more regular meetings were organized since then. Those conferences met at Vienna (1815), Paris (1856), Berlin (1878 and 1885), Algeciras (1906), London (1912). Successively international conferences have condemned slavery, regulated navigation on international rivers, suppressed privateering, proclaimed the right of men to their language and religion in nations composed of people of different nationalities, applied the principle of open door to the Congo Basin and Morocco, guaranteed the right of backward peoples.

Besides these conferences which had specifically a more European character, except those of Berlin (885) and Algeciras (1906), in which the United States of America also participated, numerous official conferences with a more technical aim have been held mainly during tne last fifty years. About sixty different matters have been discussed by the most competent men of the world in the most varied domains of human activity. Nineteen permanent bureaus and offices have been organized, of which two at least, the International Postal Office at Berne and the International Institute of Agriculture at Rome, are supported by all the civilized states of the world.

An enumeration of the main questions considered will show how far-reaching is the work already performed. They are in part: publication of customs tariffs, sugar production and exportation, contraband of arms to backward peoples, importation of alcohol into Africa, slave trade, white-slave traffic, preservation of animals (seal, fishes, birds, etc.), suppression of opium traffic, propagation of phylloxera, unification of weights and measures, railroad transportation, postal, telegraphic and radiotelegraphic relations, protection of submarine cables, regulation of maritime signals and roads, workingmen's protection, exchange of scientific and public publications and of artistic reproductions, unification of private and commercial legislation, protection of patents and trademarks, unification of commercial statistics, geodetic and seismologic researches, exploration of the seas, publication of the map of the world. This movement toward international agreement and law was gaining in strength each year. Stopped by the war, there is little doubt that it will revive stronger and pursue its course in a more regular and systematic way when the war is over. Business men perhaps more than others should be anxious to support such endeavors for a better understanding among nations establishing more firmly enlightened standards to govern their inter-relations and furnishing a more elaborate and organic body of international public and administrative law. The present war has again incontrovertibly shown the fundamental need for this. The problem is, then, not new or novel, but needs only to be broadened and organized to yield all the desired benefits.

RECOMMENDATION FIVE

The organization of a System of Commercial and Financial Non-Intercourse, to be followed by military force if necessary, to be applied to those nations entering into the foregoing arrangements and then going to war without first submitting their differences to an agreed upon tribunal.

There is a difference of opinion as to the employment of force to compel any signatory nation to submit its cause to an international tribunal before going to war. Your committee, however, believes that the great majority of the practical men of the United States who hold themselves responsible for reasonable progress see the necessity of the employment of an adequate pressure or force to compel signatory nations to bring their cause before an International Court or Council of Conciliation before going to war; because, however, desirable it may be theoretically not to use force, yet the history of the last one hundred years, the many wars during that time and the events of hte present war have made apparent the fundamental need of an international power to enforce the submission of international disputes to a court. The alternative is constantly recurring wars and in the interval between these wars, the increasing absorption in preparations for war of the resources of the principal nations of the world.

Your committee does not suggest that the world can do without armies. We do not think that it can, at the present stage of civilization, any more than we can do without a militia. But just as, within the state, there are many things we use, besides the militia and before we use the state militia or call upon Federal troops for the enforcement of a law or the execution of a court's judgment, so there are forces we can use internationally before we employ our armies and navies.

These forces can be summarized in the term economic pressure, by which we mean the commercial and financial boycott

of any nation that goes to war without submitting its dispute to judgment or inquiry. Our plea is that in the first instance the use of economic force is clearly indicated, and that military force should be resorted to only if economic pressure prove ineffective.

In considering such a use of economic pressure, it should be borne in mind that it already comes to pass automatically within a more limited area when nations go to war. Warring nations promptly boycott each other. This is important to keep in mind because confusion on this point sometimes prompts the argument that "non-intercourse would be a more expensive weapon than war," as though the fact of going to war in some way avoided non-intercourse. What your committee really means by its recommendation is that, in the future, arrangements for international enforcement of the economic boycott should be organized on a world-wide scale, and that in these world-wide arrangements nations better fitted to co-operate with economic than with military power could also have a part in the application of the pressure needed to preserve the world's prosperity and progress.

The boycott could be of progressive severity. In the first, and what would probably usually be the effective stage, the signatory nations would refuse to buy from or sell to the offending nation. If the offenses, however, were aggravated and persistent, all intercourse could be suspended, and if that proved insufficient, then, as the last step, recourse could be taken to military force.

It is the deterrent effect of organized non-intercourse which would make war less likely, since it would be a terrible penalty to incur and one more difficult in a sense to fight against than military measures. Further, its systematic organization would tend to make any subsequent military action by the co-operating nations more effective.

Many states that, for various reasons, might not be able to co-operate with military force could co-operate by their economic force, and so render the action against the offending state more effective, and that, in the end ,would be more humane.

It is argued that this plan is a two-edged weapon likely to injure ourselves as much as the nation at which it is aimed. In other words, it is costly, but is not all punishment costly? War, too, is costly, and self-injurious to the nation which essays it. Is not the whole system of peace within the state based on the principle that we are prepared to pay for the prevention of law-breaking? Our proposition implies that the coercing members shall outweigh the members to be coerced. In that case the cost would be distributed and the mutual markets conserved. And if the war would finally prove inevitable, the expense of the boycott could be regarded merely as a part of its necessary preparation, by shortening the strictly military stage just so much.

It may be contended that it would be to locate the responsibility of an offending nation soon and clearly enough to insure a just and probably effective use of economic pressure before war had begun. But in dealing with individuals the police power leaves decisions to the court. Nations submitting their differences to an established tribunal for conciliation or judgment before going to war would not come under the proposed plan of pressure. It would apply automatically to all other signatory nations.

To the contention that the plan would bear with undue hardship upon individuals of special trades and industries, it may be replied that so does war. Your committee thinks it would be easier to prevent that special distress during non-intercourse than in the event of war. The experience of the combatants of this war is particularly enlightening on this point. On the morrow of the declaration of war, many credit institutions in England (the same thing was true of Germany) found themselves threatened with what would have been, in the absence of special measures, absolute ruin. But special measures were taken, and the government successfully used its power to prevent all the effects of the war falling upon any one class of the community.

(To be concluded.)

Kansas City Merger Situation

Steps to effect the merger of the Home and Bell Telephone Companies in Kansas City, Mo., will be rushed, Arthur F. Adams, vice-president of the Home company, and now assisting Postmaster General Burleson in arranging the consolidation, announced after his return from Washington.

Only legal matters and the approval of city and state governments bar the way to the establishment of the long desired consolidation, Mr. Adams said. The commissions of Missouri and Kansas and the councils and commissioners of Kansas City, Mo., the Kansas side, Independence, Rosedale and others must approve and lend aid to the single system plans before the merger can be made.

Both companies have agreed by contract to merge, and all details, such as physical properties, franchise rights, stock and bond transfers and reorganization, have been accepted and signed for. The Postmaster General, for the government, has approved these details and indorsed the proposal to merge.

Mr. Burleson even went further than that. Pending the complete organization of a bureau for operating wire lines, he directed Mr. Adams to complete the consolidation of the two companies and submit later the merger plans.

Probably the first relief the city will get from the merger will be the "hooking up" of the two long distance systems, Mr. Adams said. This will give equal service to Home and Bell patrons. The physical task of merging the properties into a single system for the city will require many months after the consolidation of the companies.

Provided city and state authorities lend aid to expedite the merger, all details can be completed in two or three months, Mr. Adams estimated. In a few days more the long distance single service can be inaugurated, he stated.

Details of the steps taken so far and the approval and recommendations of Postmaster General Burleson will be presented immediately to the Kansas and Missouri utility commissions and the municipalities interested. Then will follow conferences, after which city attorneys will make their reports in supplements to the main proposal to their councilmen and commissioners. On their actions depend the time and details of the merger.

"I am hopeful for an early consolidation," Mr. Adams said. "For years Greater Kansas City has asked for a single system and now that the government is in control, most of the obstacles disappear. The companies are ready. All details are arranged and agreed to—even the incorporation of the new company to take over the combined properties. The cities and states interested now have complete power to merge the two companies."

Public Utility Commission News

Reports Concerning the Activities of State Regulating Bodies in the Telephone Field

Alabama

MORE than two years' efforts of the city of Birmingham to obtain cheaper telephone rates met defeat in the Alabama Public Service Commission when that body, by a divided vote, handed down a decision denying the petition of the city of Birmingham against the Southern Bell Telephone and Telegraph Company. President Samuel P. Kennedy and Associate Commissioner B. H. Cooper of Birmingham, held that the profits of the company are not unreasonable and that the petition should be denied. Associate Commissioner Gaillard of Mobile dissented from the majority.

The fight for lower rates started in Birmingham during the administration of Mayor George Ward and has been pending before the public service commission since the fall of 1915. The petition urged a reduction of rates on the grounds that the rates charged for telephones were exorbitant, excessive and discriminatory, growing out of the zone system that had been established.

Fully a year ago, the commission directed that the books of the company be turned over to expert examiners of the city of Birmingham for inspection. Months were required for the audit. After that phase of the litigation was completed, the matter has been continued from time to time and volumes of briefs have been filed with the commission. The city filed two briefs, one containing 242 printed pages, while the one brief of the company was 180 pages.

In reaching their conclusion, President Kennedy and Associate Cooper found the value of the company's plant at Birmingham to be $2,400,000; that the four and one-half per cent of the gross revenues paid by the Bell company to the American Telephone and Telegraph Company for services rendered by it to the local company was fair and reasonable; that the reserve fund set aside for depreciation, aggregating five and one-half per cent of the gross revenue, was not excessive; and that the net revenue derived by the company was not excessive and that, therefore, the petition should be denied.

The majority also disapproved the zone system, and considered the rates charged for extension telephones too great. In view of the fact, however, that the net revenues were not regarded as excessive, no specific order was made reducing the rates on extension telephones. The zone phase of the litigation was left open for future orders.

Associate Commissioner Gaillard held that the value of the plant is $2,000,000, which is $400,000 less than the valuation fixed by the majority; that the four and one-half per cent paid by the local company to the American Company is excessive, although the American company is entitled to compensation by way of quantum meruit (service rendered without contract); this compensation, he thought, should be 75 cents per instrument in use, this being less than one-half the amount allowed under the 4¼ per cent gross. He also held that the amount set aside as a reserve for depreciation is excessive, three and one-half per cent, in his opinion, being a reasonable amount in view of the reserve already accumulated and unexpended.

The commission later refused the city of Birmingham permission to show that objections were raised in order that an appeal might be taken in the Southern Bell Telephone and Telegraph Company rate case. The commission based its ruling on an act of the legislature which it claimed gave it final jurisdiction and that no appeal can be taken to the supreme court from the findings of the body, because the decision was not adverse to the corporation that was the defendant.

Colorado

The brief of the Colorado Public Utilities Commission in the case of the city and county of Denver versus the public utilities commission, over the question of the commission's jurisdiction in the fixing of the telephone company's rate has been filed with the clerk of the Supreme Court.

The brief, which fills twenty-five pages, attempts to prove that it was not in the meaning of the home rule amendment to the state constitution to give the city the right to regulate its own public utilities when the service of the utility was not confined to the city, but extended to all parts of the state. It is held that the telephone company's service extends to every town in the state and that the rates cannot be fixed upon the company's service in Denver alone.

Illinois

The Chicago Telephone Company filed with the State Utilities Commission a petition for a 30 per cent raise in all of Cook, Du Page, Grundy, Kane, Kendall, Lake, McHenry and Will counties.

Chicago is excepted.

Toll rates to Chicago will not be affected.

All charges involved are flat rate—or unlimited service.

All of the towns and villages have filed their appearances through their respective attorneys before the commission in response to the petition. The hearing will be continued December 10 at Chicago.

It is reported that W. N. Furthman will be retained by all the counties to act as their engineer representative.

The most recent summary of rate increases granted to public utilities covering the period from July 14 to October 5 shows that 364 cases were acted upon with flat denials in only ten cases. Of the increases a total of 155 were allowed to telephone companies, while the electric companies were granted sixty-four, and electric railways fifty-five. In addition to straight increases various companies in individual cases were allowed increases in the form of surcharges, emergency increases and special charges.

The Virden Telephone Company was authorized to increase its rates in Virden, Macoupin county, by the Illinois Public Utilities Commission. The new rates are as follows:

Independent lines, business, $36 per year; residences, $24 per year.

Two-party lines, business, $30 per year; residences, $18 per year.

The State Utilities Commission suspended the increased telephone rates for the Tri-County Telephone Company, with headquarters at Mt. Vernon, until February, 1919. The company wanted the increased rates to become effective November first.

Because of the lack of one word, Judge E. S. Smith in the Circuit Court of Sangamon County set aside the order of the Public Utilities Commission in the case of Meyer J. Stein against the city of Chicago—the order providing that the telephone company should file a new schedule of rates within ninety days. The order stated the new schedule should "avoid all discrimination." Judge Smith held that had the order read "unlawful

discrimination" it would have been confirmed. The judge did rule, however, that the city under no circumstances has the right to fix the rates.

The Public Utilities Commission ordered the reorganization committee of the Western Illinois Telephone Company to sell and the Mann Telephone Company to buy all telephone property of the former company in Bushnell, Camp Point, Good Hope, Lima, Lorraine, Ursa, and in the counties of Adams, Hancock and McDonough, together with toll lines connecting Macomb and Prairie City and other toll and rural lines.

The consideration is $43,965, the Mann company to assume a mortgage now on the property at Bushnell and to pay within 60 days, when the transfer is to be completed, the sum of $35,965.

Common capital stock in the sum of $44,000 is authorized to be issued by the Mann company to pay for the transaction.

Effective December 1, new telephone rates of the Central Union Telephone Company at Lewistown are authorized by the public utilities commission as follow:

Individual business station, $30 a year; individual residence station, $21; two-party residence, $18; four-party residence, $15; rural multi-party business, $24; rural multi-party residence, $18.

Indiana

With the sale and merger of two warring telephone companies at Boswell, Ind., the final chapter was concluded in a public utility fight that has been one of the most unique in the history of the Indiana Public Service Commission.

The trouble started four years ago when the Boswell Telephone Company asked the commission for an increase in rates. Rural residents and business men of Benton and Warren counties immediately started to organize the Farmers' and Merchants' Telephone Company. William J. Lawson, a wealthy farmer of Benton county, became one of the principal stockholders of the new enterprise, while his brother, Charles Lawson, was president of the Boswell company.

The difficulties between the rival companies took on new issues when the Public Service Commission ordered that the new concern could not operate its lines in the town of Boswell. In order to be within the ruling of the commission the new company built its exchange only a few feet outside of the corporate limits of Boswell. Meanwhile the farmers' company appealed from the decision of the commission and carried the litigation to the Indiana Supreme Court, which held with the commission that two companies could not operate in Boswell on the grounds that there was no public necessity for duplication of lines and service.

During the last two sessions of the legislature each of the Boswell factions endeavored to bring about the enactment of a law that would affect the power of the commission. The Farmers' company sought to limit the power of the commission so that it would not be excluded from Boswell, while the other company made determined efforts to extend the power of the commission along this line. Neither side got anywhere with their attempts and the power of the commission remained the same. It is estimated that the total amount of money expended for attorney fees and other expenses in waging the fight by the two companies amounted to $70,000, while the appraised value of the two concerns by the commission is only $30,000. Because of the duplication of service in the rural districts outside of Boswell both companies operated at a loss.

About a month ago at the proposal of Chairman Lewis the companies agreed to the appointment of a board of trustees in order to bring about the consolidation of the property in order to sell it to one purchaser. Frank O. Cuppy, general manager of the Lafayette Telephone Company, was chosen as a trustee to represent the Boswell company; A. W. Timmons of Lochiel, Ind., to represent the Farmers' company, and H. O. Garman, chief engineer of the commission, to represent the commission.

It was determined by the trustees that the physical value of both companies was only $45,000 and that $15,000 would have to be deducted from this because of imprudent investment in duplicated service.

Still determined to own the Boswell telephone interests William J. Lawson, president of the Farmers' company, gave the highest bid for the property, paying $43,000.

A ruling granting the application of the Rushville Co-operative Telephone Company to construct, operate and maintain a telephone exchange, plant and system in Glenwood has been the Indiana Public Service Commission. The hearing on the application was conducted in Glenwood by the commission, October 28.

The finding sets forth that the commission found the present telephone service received by the thirty-five subscribers in the town, through the Falmouth and Orange exchanges, is wholly inadequate and insufficient; that subscribers residing in said town can only communicate with each other by going long distances through aforesaid exchanges. Approximately one-half of the telephone subscribers are served through the Orange exchange and the remainder through the Falmouth exchange. Both the Orange and Falmouth telephone companies were notified of the date of the hearing and neither appeared to object against the proposed installation. No other protests were raised at the hearing, the president of the Glenwood town board having testified that no one had raised an objection.

The Public Service Commission denied the petition of the Central Union Telephone Company for a rehearing of the Indiana Hotel Company's case, which was decided several months ago with an order instructing the telephone company to provide trunk lines to the Claypool Hotel for service to the rooms of the hotel. The Claypool was built with private telephone service to the rooms and the Central Union Telephone Company refused to install trunk lines to connect with the private system. In denying the rehearing the commission held that the hotel was entitled to adequate service; that the hotel's telephone system was a public utility under the law and that physical connection with it should be established.

Minnesota

The Annandale Telephone Exchange Company is permitted to place in effect, as of November 1, 1918, the following schedule of exchange rates for local telephone service at Annandale, Minnesota:

Individual line, business	$2.25 per month
Two-party line, busines	2.00 per month
Individual line, residence	1.50 per month
Two-party line, residence	1.25 per month
Four-party line, residence	1.00 per month
Rural multi-party (co. owned)	1.25 per month
Season rate for cottages	12.00 per year

The Dassel-Collinwood Telephone Company is permitted to place in effect, as of December 1, 1918, the following schedule of exchange rates for local telephone service at Dassel, Minnesota:

Individual line, business	$2.00 per month
Individual line, residence	1.50 per month
Rural multi-party (company owned)	1.50 per month

The Franklin Local and Rural Telephone Company is permitted to place in effect, as of December 1, 1918, a rural multi-party rate of $1.50 per month.

The Henderson Telephone Company is permitted to place in effect, as of December 1, 1918, a rural multi-party rate of $1.50 per month. A discount of 75 cents to be allowed if payment is made during the first month of the quarter in which the service is rendered; a discount of 50 cents if paid during the second month of the quarter, and a discount of 25 cents if paid during the third month of the quarter.

The Woodgate Telephone System is authorized to place in effect, as of November 1, 1918, the following rates:

Slayton

Individual line, business, per month, gross	$2.75
Individual line, residence (wall set), per month, gross	1.75
Four-party line, residence (wall set), per month, gross	1.25
Rural multi-party (company owned), per month, gross	1.50
Extension sets, business or residence, per month, net	.50
Desk sets, residence service, per month, net additional	.25
Extension bells, per year	2.00

Lake Wilson, Iona, Currie and Balaton

Individual line, business, per month, gross	$2.50
Individual line, residence (wall set), per month, gross	1.50
Four-party line, residence (wall set), per month, gross	1.25
Rural multi-party (company owned), per month, gross	1.50
Extension sets, business or residence, per month, net	.50
Desk sets, residence service, per month, net additional	.25
Extension bells, per year	2.00

Exchange rates to be paid monthly in advance with a discount of 25 cents per month on all gross rates if paid on or before the 15th of the month in which the service is rendered.

Rural rates to be payable quarterly in advance with a discount of 75 cents if paid on or before the 15th of the first month of the quarter; a discount of 50 cents if paid on or before the 15th of the second month of the quarter, and a discount of 25 cents if paid on or before the 15th of the third month of the quarter. A toll rate of 10 cents for three minutes and 5 cents for each additional minute between any of the above exchanges over the toll circuits of the Woodgate System.

Missouri

Petition to the Missouri Public Service Commission for an increase in rates by the Joplin Home Telephone Company has been filed. This schedule of new rates differs from the schedule previously filed with the commission in the following particulars:

Straight line business, present rate per annum, $42; proposed rate, $48.

Four-party line business, present rate per annum, $36; proposed rate, $42.

Eight-party line business, present rate per annum, $24; proposed rate, $27.

Straight line residence, present rate per annum, $24; proposed rate, $30.

Four-party line residence, present rate per annum, $21; proposed rate, $24.

P. B. X. trunks, present rate per annum, $36; proposed rate $48.

I. C. S. trunks, present rate per annum, $30; proposed rate, $48.

Combination exchange and pay station, present rate per annum, $36; proposed rate, $43.20.

Radius charge (one-fourth mile), present rate per annum, $4.20; proposed rate, $36.

Desk sets extra (decreased), present rate per annum, $6; proposed rate, $3.

In its petition the Home Telephone Company states that its property on August 1, 1918, was worth $596,114.97. It is also claimed that the returns for the first seven months ending July 31, 1918, have been 1.5 per cent upon the investment, while if the same rates of revenue continue during the remainder of the year as during the first seven months there will be available for returns 3.7 per cent.

It is set forth that the small return is due to the fact that during the year, despite the greater frugality of management, the increased cost of material, supplies and wages has prevented making any more money.

It is claimed that the new rate, provided there is no increase in business, will only yield an annual net revenue of $37,643.86, which is 6 per cent return on the valuation.

Application of the Butler Telephone Company for an increase in rates is denied. The decision of the Commission is based on the evidence at a hearing held at Butler.

The commission decides that the local telephone company has not complied with the order as to improvements required and that conditions in Butler will not justify the asked-for increased in rates.

The telephone company is, however, allowed to make charges for connections over country lines.

Another hearing will probably be held at Butler some time in the near future.

The telephone rates of Webb City have been increased following an announcement from the state Public Service Commission at Jefferson City. The increased rates went into effect November 1, for one year.

The rates are:

Single line business telephone, raised from $2 to $3 per month.

Party line business, $1.75 to $2.50.

Single line residence, $1.50 to $2.00.

Party line residence, $1.25 to $1.50.

Desk sets, to be 25 cents.

A change is made in the equipment. Ring-off drops are to be supplemented by lamp signals on the switchboard and the number designation in the directory will be changed to colors.

Nebraska

The Lincoln Telephone and Telegraph Company was granted permission by the state railway commission to boost its rates to "standard" in 66 of the 106 exchanges; to raise its tolls 25 per cent and to extend the day toll rates from 6 to 9 p. m., when the half-rate for service becomes effective.

The commission's order went into effect November 1 and will continue until May 1, 1919. Before this time expires the company is required to make a detailed report on the reasonableness of the rates at each particular exchange.

In the meantime the company must build up a depreciation reserve equal to 9 per cent of its capital, which is $7,201,138, before any dividends are to be paid on any stock. Dividends are then to be limited to 7 per cent on common stock, 5 per cent on preferred and the regular interest on bonds. After this the surplus is to be set aside in such a shape as the commission can direct the disposition of it.

The commission found, according to the order written by Commissioner Wilson, that the company had used its depreciation for consolidation purposes, there being actually no funds available to be applied on depreciation.

Additional revenue amounting to $300,000 was needed, the commission concede, because the 1,206 employees were in need of higher wages and to allow the firm to employ from 100 to 200 more persons.

The need of $100,000 more revenue was found necessary becauses material had increased 50 per cent.

In Lincoln business telephones are unaffected by the increase. Residence two-party telephones are raised from $1.75 to $2, affecting 5,083 subscribers, and residence one-party lines are raised from $2.25 to $2.50, affecting 3,208 subscribers.

The Nebraska Railway Commission has increased the rates of the Nebraska Telephone Company of Omaha to raise $432,000 additional revenue for wage increases and other war expenses. The company asked for an increase of $650,000.

A total increase of 25 per cent effective November 1, calculated to raise $210,858, and an increase of 10 per cent on the ninety-six exchanges of the company serving 80,00 subscribers, which raises $221,185 and becomes effective December 1, constitutes the main features of the order.

The rates are only for a "six months' emergency," and expire May 1. They can only be renewed after that time by showing on the part of the company as to their reasonableness on the basis of the six months' trial.

Of the increases granted by the company, $50,00 is to go toward employees whose wages are below $125 a month, $60,000 for taxes, and $22,000 for increased cost of materials.

The company is held down to 7 per cent dividends on common stock and 6 per cent interest on borrowed money, none of which is to be paid until the company has accumulated a depreciation reserve equal to 9 per cent of the actual money invested in the corporation, which the commission has found to be $13,-000,000.

The commission ascertained this figure by delving into the records of the company back as far as 1884.

Whatever surplus remains after depreciation, dividends and interest are taken care of remains subject to disposition by the railway commission.

A number of applications for increases by small telephone companies in different parts of the state have been received by the state railway commission and among those allowed are the following:

The Palisades Telephone Company was allowed to increase its rates. The company desired to charge $2 for business and $1.50 for residence and company owned farm telephones and 50 cents per month for switching independent lines. The company has been charging $1.50 for business telephones, $1 for residence and farm telephones and 35 cents for switching. The commission permits the company to charge rates as follows: $1.75 for business; $1.25 for residence, owned by subscribers; $1.50 for bupsiness; $1.25 for residence, owned by subscribers; $1.50 for residence owned by the company; $1.25 for farm, owned by subscribers; $1.50 for farm telephones owned by the company; 70 cents for switching company owned farm instruments, payable quarterly in advance; 45 cents for switching where none of the property is owned by the company. For the past sixteen months the company has earned only $228 net profit.

The commission held hearings on several applications, the application of the Scribner Telephone Company coming up for hearing November 19.

The Dodge Telephone Company has two applications on file which will be taken up shortly. One application is for the purpose of eliminiating free service between its exchanges at North Bend, Snyder and Dodge and the other for an increase in rates of 25 cents all around.

On November 19 two applications of the Kenesaw Telephone Company were heard, the first for the right to issue $7,000 in stocks to take the place of wages for officers which have not been paid but have been put back into the plant. The second application is for an increase in the rate of residence telephones of 25 cents, which will make the rate $1.50 a month, while business telephones will be increased 50 cents to $2.50 if the application is allowed.

New York

Chairman Charles B. Hill, of the Public Service Commission, second district, while in Washington attending the annual conference of state utility commissioners, had an interview with Federal officials on telephone questions. Mr. Hill took up the matter of the charges on new installation and telephone changes which was ordered by the federal administration and from which the commission had been flooded with complaints, especially from Greater New York and from Buffalo, Rochester and other large centers.

In reference as to whether the commission has power to hear a telephone rate case in which Buffalo is at present interested, Mr. Hill said that while things at this time were not definite, there was no reason to believe there would be any conflict between the commission and the government. Mr. Hill gave out the following statement:

"I was unable to discover, by reason of the signing of the armistice and prospects of an early peace, that there was any change in views on the part of the postmaster-general in regard to his control and operation of the wire systems.

"I think the commission will determine, however, to proceed at once to consider the numerous complaints it has received against the installation charges authorized by the postmaster-general, on the theory that in due course, and in view of the uncertainty of a very early peace, there will be no ultimate conflict in authority between the commission and the postmaster-general. I gathered at Washington that this was the attitude of the state commissioners."

At a conference of the National Association of Railway and Utilities Commissioners at Washington, Chairman Hill, of the New York Up-State Commission, introduced a resolution recommending to the postmaster-general "that federal control of the telephone and telegraph lines cease as soon as the military necessity therefor shall have ended."

Ohio

Business telephones of the Central Union Telephone Company are to be increased December 1, from $4.50 a month to $6, for individual lines, and from $3 to $4.50 a month for two-party lines, according to the ammouncement of the company in filing the new schedule with the Public Utilities Commission. This is the first increase in business rates in nearly 14 years, during which time the number of telephones has increased from 6,000 to 30,000. E. A. Reed, general manager, said:

"The net income from the exchange service revenue of the Columbus exchange for the year 1917 was but $11,034. The necessity for conserving for war purposes the material and labor, ordinarily used for plant extensions, will prevent any considerable net increase in revenue during 1918 from added stations. The only increase in exchange service revenue, from which to meet increased operating expenses, is that obtained from the increase in residence rates at the beginning of the present year, which increase, amounting to approximately $100,000 a year, will be absorbed practically by increases in wages and other expenses already incurred. The proposed increase, if paid by every present business subscriber, will yield an increased revenue of less than $80,000 a year. We consider that at least this amount will be needed to meet the further increase in the cost of operation on the basis of present cost and additional increased expenses, which now seem inevitable."

In a communication to a telephone user in Akron, who protested aganist the jump in Bell telephone rates, the Public Utilities Commission of Ohio has replied to the effect it has never been advised regarding the factors which the Central Union Telephone Company officials hold as justifying increases.

While asserting that the telephone company has the right, under the law, to inaugurate such rates as it deems proper, the commission also takes the stand that such rates are open to the challenge of any citizen, firm or corporation, and such challenge may be filed with the commission.

The letter containing this information was received by J. W. Murphy from H. L. Goodread, recretary of the commission. Mr. Murphy has filed it with Clerk Harry N. Seiler of council. The letter says:

"We have your communication protesting against increases in rates for residential telephone service of the Central Union Telephone Company which became operative November 1. Responding thereto, we have to advise you that these rates neither require the approval of the commission nor were so approved. Under laws of Ohio, a telephone company has the right, in the first instance, to inaugurate such rates as it deems proper. Rates for telephone service, of course, are subject to the same conditions as all other service offered for public use. The only requirement of law is that the company shall publish the rates and file them for a period of 30 days before going into effect, and in the office of this commission.

"Such rates are open to challenge by any person, firm or corporation, as to their reasonableness or justice. Such a challenge must, under the law, be of a formal character and drafted in legal form. The law is explicit in the matter, and any attorney can advise you as to procedure.

"Since the receivers of the Central Union Telephone Company have merely exercised their lawful right in filing a new tariff, we have been advised as to none of the factors which they consider justify this increase. Under the circumstances you will readily appreciate both the impossibility and impropriety of this commission now attempting to pass upon the reasonableness of the new rates."

The Sidney Telephone Company, Sidney, was authorized to distribute a stock dividend of $34,500. The Home Telephone Company of Ironton was authorized to sell $16,000 first mortgage 6 per cent bonds at 92, to reimburse its income for capital additions made in the last five years. The proceeds of these bonds will now be available for dividends. The commission also completed the Urbana merger, where the local company was in September authorized to buy the local plant of the Central Union. The commission approved the issue of $20,000 common stock of the Urbana Telephone Company to pay for this property. The receivers of the Central Union, to secure a voice in the control of the Urbana company, were authorized to hold both this $20,000 of new stock and to buy from present holders $25,000 of the now outstanding stock.

Oregon

Frequent use of the Home automatic instead of the Pacific manual telephone was urged by the Public Service Commission as a means of relieving the congestion and the consequent inadequate service over the wires of the latttr company in the city of Portland.

Three weeks' investigation by Frank J. Miller, chairman, and F. A. Rasch, examiner, of the Public Service Commission, convinced them that the telephone companies were not responsible for the condition existing. They found the Pacific company overburdened with calls and unable to maintain its proper force because of inability to pay higher wages, while the Home telephone, because of a public habit, was left unused on 50 per cent of the occasions when it might be used in place of the Pacific.

"We find that the telephone companies are paying $9 a week for beginners and $15.60 a week for finished operators who have been in the service a long time," said Mr. Miller. "It is practically impossible to keep women working at these wages when everything else is on the increase. Nor do we believe that the profit-earning capacity of the telephone company would permit an increase. A simultaneous granting of higher rates to the company and higher wages to the operators would doubtless bring much relief.

"But until that comes, if it does come, it is in the power of the public to relieve the condition by co-operation. The Pacific telephone is taxed far beyond its capacity, and many of the calls which burden it could go over the Home switchboard, which is never congested. Moreover, the Home is automatic, and therefore is operated at small cost, while the Pacific must have countless operators to care for its calls.

"Now that the telephone companies have been merged into one system, the use of this or that telephone has no advantage over the other. Nothing but habit is making the public turn all its attention to the Pacific. This habit must be given up, or our telephone system will become worse.

"The Home automatic has 10,000 telephones in this city. All long distance calls which emanate in Portland can be sent over it, even to a subscriber of the Pacific. That is, a person having a Pacific telephone in Salem, or any other Northwestern point, can be talked to over the Home. These long distance calls alone would greatly decrease the work which is being done on the Pacific switchboard.

"Again, every hotel, hospital, business house and other public place in Portland, with few exceptions, have the Home automatic installed, and this should be used instead of the Pacific. The hotels in particular have an intercommunicating system by which a guest may talk over the Pacific to a person on the outside using a Home.

"Our investigation disclosed that the Home is not used for 50 per cent of its capacity. Besides, there are 7,000 Home telephones stored in a Portland warehouse, the installation of which would greatly relieve the existing troublesome service.

"Everyone who has the public interest at heart should use the Home telephone and encourage others to do so whenever possible. The adoption of this habit is the only means of relief which we can offer at the present time."

With the assertion that the commission had no right to set aside state statutes, Chairman Miller and Commissioner Buchtel, of the Public Service Commission, declared they would not follow the lead of the Washington state commission by surrendering to Postmaster-General Burleson rights given the commission by the state laws of Oregon.

Disclosure that Postmaster-General Burleson did not order an increase in the service rates of the Pacific Telephone & Telegraph Company came through a telegram received by the commission. The postmaster-general says he merely gave the increases his approval, having been informed that they were to meet wage increases and that they were regularly filed with the commission.

Upon receipt of the telegram, the commission filed a night letter to Mr. Burleson, quoting a letter received from Charles H. Carey, attorney for the telephone company, in which the claim was made that the postmaster-general had authorized the increases and that "the company is merely the agent of the government in performing this duty." The night letter further quotes from an order issued by the commission subsequently.

"Based upon a communication from Attorney Carey, of the telephone company, and the Public Utility act," the order says, "It is hereby ordered that said schedules filed by the Pacific Telephone & Telegraph Company on November 4, 1918, are declared of no force and effect. It is further ordered that the only exchange telephone rates of the Pacific Telephone & Telegraph Company, in force in the state or Oregon, are shown in the schedule on file with the commission prior to November 4, 1918."

Pennsylvania

Orders permitting the Bell Telephone Company to put into effect upon one day's notice the new rates for installing and moving telephones in compliance with the order of the post-

master-general were issued by the Public Service Commission with the observance that "the commission does not feel called upon to pass upon the wisdom or expediency of this schedule nor to express its own doubt of its propriety under existing circumstances." The order states that "for the period of the war and while the telephone company is being operated under federal control, subject to such complaints as may be hereafter lodged, and to our further decisions and orders made thereon, permission should be given."

Washington

No further efforts will be made by the Public Service Commission of this state to exercise regulative jurisdiction over telephone management. Only informal cases where adjustments may be made without affecting rates or federal rulings will be taken up by the commission, the latter announces in a statement which predicts the probability of a radical increase in rates. Protests against rates as fixed by federal direction may still be filed with the state commission to be forwarded to the postmaster-general's department at Washington, D. C.

This policy was announced by the commission in dismissing a hearing on telephone rates at Spokane, which was originally set by the commission on telegraphed request of A. S. Burleson, postmaster-general. Following the procedure advised by the attorney-general to the effect that railroad regulation complaints must make W. G. McAdoo, director-general, defendant as well as the railroads cited, the commission instituted an action in the Spokane case and named the postmaster-general as defendant.

The state commission makes public the following letter written the commission by J. C. Koons, acting postmaster-general:

"Referring to the telegram of the postmaster-general in which he requested your commission to take up the telephone rate case of Spokane, I have to advise you that upon looking farther into the matter the department has decided to withdraw this request.

"In this connection I will state that a general plan of co-operation with the Public Service Commissions of the several states is being prepared and will be taken up with you at a later date."

In its notice of dismissal of the Spokane case and generally any other state cases involving telephone or telegraph rates the state commission says:

"Under the circumstances we are dismissing the action which we brought and, in view of the attitude of the postmaster-general that he has complete jurisdiction over the rates and service of all telegraphs and telephones we shall not interfere with his procedure, but will co-operate wherever requested so to do.

"In the discussion at Washington it was made clear to us the government plans to standardize rates and probably radically increase them to meet operating expenses, and will continue to collect in Spokane the same rates heretofore collected by the utility until the standardized rates are put into effect."

As understood by the commission the government now takes jurisdiction over all farmer lines and rural telephone systems, even those that have been roughly constructed to meet the necessities of lumbering operations, and that these will probably be included in the program of the rate standardization. Charges now collected, including the $5, $10 and $15 installation charges, stand until changed by order of the postmaster-general's department."

The postmaster-general of the United States is made co-defendant with the Pacific Telephone & Telegraph Company in a complaint filed by city officials with the state Public Service Commission. The action followed a special meeting of the city council, when a resolution was adopted directing the corporation counsel to fight the rate increases which the telephone company proposed to put into effect November 15. The complaint alleges that the telephone company claims to be acting under the authority and advice of Albert S. Burleson, postmaster-general, and that the defendants are "attempting to regulate, under the guise of federal control, matters which are purely local and within the police power of the state of Washington and within the jurisdiction of the Public Service Commission."

The complaint charges the telephone company with having rendered service in a "slow, inexpeditious and inefficient manner for a long time past," and urges the Public Service Commission to suspend the operation of the proposed tariff issued on November 5 for a period of ninety days from November 15, the date it would otherwise go into effect, and require the Pacific Telephone & Telegraph Company to render telephone service within the limits of the city of Seattle at the rates provided in the existing tariff and in a prompt, expeditious and efficient manner.

Asserting that the rates charged in the proposed tariff, including the elimination of the 10 per cent discount for bills paid before the 10th of the month, are "unjust, unreasonable and contrary to law," the complaint further alleges that the defendant company is seeking to put the new tariff into effect in less than the time prescribed by law. In proposing to have these rates become operative November 15, the telephone company is acting "without the thirty-day notice to or permission of the state Public Service Commission," the complaint states.

The new tariff proposed by the telephone company increases rates in Seattle as follows: Business telephones for unlimited service individual line, from $7.50 per month to $8.50 per month wall-set, and $7.50 per month to $8.75 per month for desk-set telephones; for residence telephones, unlimited service, individual line, from $3 per month to $3.50 per month for wall-set, and from $3.50 per month to $4 per month, if desk-set; two-party line, from $2.50 per month to $3 per month, wall-set; four-party line, from $2.25 per month to $2.50 per month for wall-set.

That the increased telephone rates would go into effect in Washington as of November 15, but that none of the money derived from the increased tariffs will be used for telephone service outside the state, was the word received by the Public Service Commission from Acting Postmaster-General J. C. Koons in answer to the commission's telegram of protest.

"Answering your telegram of the 12th it will be necessary to place in effect increased telephone rates in order to grant increased compensation to employees." Koons wired the commission. "The additional revenues from the increased rates in the state of Washington will not be used to maintain better service elsewhere. I am in accord with your views that patrons should receive a dollar's worth of service for every dollar paid and will gladly consider any complaints mentioned in your telegram."

The Public Service Commission takes this telegram to mean that complaints by the commission as to service will be examined. The wage increase will be retroactive from October 16. The increased rates will bring Washington telephone companies $1,500,000 revenue yearly. The commission is informed by the attorney-general's office it has no power whatever to interfere with the new tariffs or to put into effect any orders, as the postmaster-general is in complete control and not required to recognize state public service commissions.

Wisconsin

The Antigo Telephone Corporation was granted its application for an increase in rates by the state Railroad Commission. The company was given authority to put into effect November 1, a new schedule embodying substantially the increases requested.

In the matter of the Wheeler Telephone Company's application for increase of rates, it was ordered that the rate of $1 per telephone be increased on basis of $1.75 for business one-party telephone, $1.50 for two-party, etc.

Of Interest to the Trade

What the Telephone and Accessory Manufacturers are Doing to Advance the Art

Construction Restrictions Lifted

With hostilities ended, Bernard M. Baruch, chairman of the War Industries Board, announced November 12 the lifting of numerous restrictions placed upon construction and production during the war.

Under a circular issued by the priorities division of the war industries board certain construction projects falling within certain classifications are approved, and no permits or licenses will be required therefor from the non-war construction section hereafter. Included are:

All buildings, structures, roadways, plant facilities or other construction projects of every nature whatsoever, undertaken by the United States railroad administration or by any rail or water tansportation company, organization or utility (whether or not under the direction of such administration), or by the American Railway Express Company, or by the owner or operator of any telegraph or telephone line.

Kellogg Bulletin on Four-Party Service

The new No. 12 Kellogg four-party line bulletin is not really a "sales bulletin," but rather thirty-two pages of powerful argument for the further introduction of four-party service, particularly in these times when it is necessary that extension demands be taken care of with a minimum of copper, lead and other materials.

The average telephone man naturally supposes that full advantage of four-party service is being taken,

Kellogg's Four-Party Booklet.

but manufacturers report that while cable mills, during the past two years, have been running day and night, grinding out cable purchased at 100 to 150 per cent advance over normal prices, very few exchanges have introduced four-party service. Although manufacturers have been able to deliver selective ringing equipment promptly and at a nominal advance over normal prices, their combined sales of selective ringing equipment are said to have been lower than during any previous period in the days of low-priced cable.

This condition would seem to indicate that the economy, simplicity and satisfaction of modern four-party selective service have not been properly forced to the attention of the telephone companies which have made, or are now contemplating, considerable expenditures for cable.

The bulletin goes into the questions thoroughly and explains how the shortcomings of the earlier systems of selective ringing and the fact that this has been a favorite "stamping ground" for inventors, have tended to put four-party selective "in bad," but that the limited increased adoption of modern four-party harmonic ringing at this time is attributable to the influence of Bell companies, hostile to harmonic ringing because it is wholly of Independent development.

The bulletin also contains a complete history of the development of four-party service, including much discussion of matters which have heretofore been largely engineering secrets. A telephone man cannot but acquire a broader view and a better understanding of the whole four-party selective propositions from a thorough reading of this most unusual bulletin which the Kellogg Switchboard & Supply Company will send without charge upon request.

International Commission Favors Metric System

More extensive use of the metric system in the trade and commerce of the United States is recommended in a resolution adopted by the United States section of the International High Commission, of which Secretary McAdoo is chairman, according to a statement issued by the Treasury Department. The statement follows:

The commission has regarded this subject as of particular importance in the United States. It is, of course, unnecessary for the United States section to recommend to the Latin-American sections of the commission anything in connection with the metric system, which is exclusively in use throughout Latin America. One of the main obstacles to documentary uniformity as between the United States and Latin America is to be found in the fact that the United States does not make the use of the metric system obligatory, and consequently its consular documents have to allow the use of that system merely as optional. Any uniform system of classifying merchandise, however, will require, on the part of the United States, thoroughgoing and complete adherence to the metric system.

Of more importance than statistical and administrative questions is the use of the metric system in trade. Now that the United States is obviously being drawn into closer and more vital commercial relations by the rest of the world, and particularly with Latin America, our manufacturers and exporters will be obliged to meet the demands of their prospective customers in a somewhat more accommodating frame of mind than hitherto. Only the English-speaking nations still have to adopt the metric system of weights and measures, and among them the British Empire, or at least Great Britain, seems to be giving serious consideration to the necessity of making a change. Those who read the Commerce Reports of the United States Department of Commerce know how numerous are the opportunities necessarily allowed to pass by because of our inability to supply goods and machinery constructed in accordance with the metric system. The subject has now assumed a most practical character in the minds of those who are planning for post-war trade expansion.

The resolution adopted by the commission is as follows:

"The United States section of the International High Com-

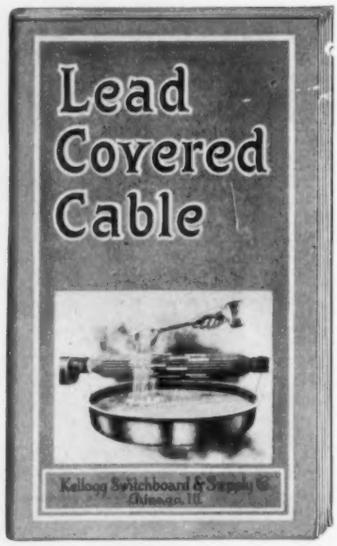
exclusive use of the metric system of weights and measures within the jurisdiction of the United States, resolves:

"I. That in the opinion of the section the adoption of that system would be productive of great advantage in the commercial relations of the United States with the other American republics.

"II. That the secretary of the section be directed to communicate a copy of this resolution to the chairman of the proper committees of the Senate and the House of Representatives."

Kellogg Booklet on Lead Covered Cable

"Telephone cables rely upon both paper and air for insulation between the conductors. As the least moisture will spoil the insulating qualities, it is necessary to keep the lead sheath or covering sealed at all times. It will be noticed that cable is received from the manufacturer with the ends hermetically healed for this same reason; therefore, when a cable sheath is opened for any purpose it should be sealed up as soon as possible, for, in the meantime, an opportunity is afforded for entrance of moisture from the surrounding atmosphere."



Book on Lead Covered Cable.

The foregoing, taken from the booklet entitled "Lead Covered Cable," being distributed by the Kellogg Switchboard & Supply Company, explains the reason why all cable work should be finished as soon as possible after starting.

Many telephone companies have lost their splicer and do, no doubt, welcome information that will be of help to them. For this reason, the Kellogg Switchboard & Supply Company has issued a booklet describing and illustrating every operation on cable splicing. Each operation is so clearly illustrated and described that a novice should be able to turn out a good job after practicing.

As an aid to the telephone man, an up-to-date list of cable splicing tools and materials is given. Complete tables of the following are also presented: Dimensions of lead sleeves for straight splices for both No. 19 and No. 20 gauge cable; dimensions of paper sleeves; weight of lead sleeves; amount of wiping solder in pounds required for cable splices, and amount of paraffin required for boiling out cable splices.

This booklet is of pocket size, sixteen pages, and is printed on high grade enameled stock, showing the illustrations to good advantage. The cover has an aluminum bronze background and is illustrated on this page.

These booklets should be of value to every telephone man, and are sent free upon request to the Kellogg Switchboard & Supply Company, Chicago.

Reconstruction in France

In the latter part of 1915 there was formed in France the Central Association for the Restoration of Industrial Life in the Invaded Regions, which comprises over 1,000 of the manufacturers affected by the war. The following year an association for the purchase and distribution of merchandise was formed, which is known as the Central Bureau for Industrial Purchase. The support of the state was insured by the voting of a preliminary credit of fifty million dollars as a fund out of which the Central Bureau would make its purchases.

American manufacturers will, of course, wish to get in touch with the Central Bureau at the earliest opportunity; but it has intimated that there would be little use in having individual American manufacturers send catalogues, just now, to the Bureau or correspond, with a view to taking orders later on. The problem is too huge for individual and competitive buying. The Bureau considers that it will be out of the question for isolated American firms, however large or well equipped, to meet the demands. It is with groups of American manufacturers—each group capable of supplying a certain industry in the invaded district, that the Central Bureau wishes to establish relations at this time.

Aero-Radio Telephone New Device

Aviators have been gossiping to one another between the air and the ground and while miles apart for more than a year, according to information reaching the general public last month for the first time, following the release of some information about the airplane wireless telephone. John D. Ryan, director of aircraft production, gave out the news.

Prior to the release, the entire aviation personnel has been under the strictest orders of secrecy concerning the airplane telephone, the orders placing that secret above all others.

The invention was made, it is reported, by Col. C. C. Culver, now stationed in Washington, but who was on duty at Rockwell field and with the rank of captain in 1916 at the time he perfected the telephone. He was a signal corps officer of the regular army, and had a hobby of communication work.

The Germans were completely baffled after the aero-telephone was installed on American planes, which accounted for such a marvelous series of air victories on the American front in the closing days of the war. The American aviators were directed from the ground. The mechanism is of such a nature that the human voice, when transmitted to or from an airplane, can be plainly heard above the roar of the motor.

The first tests were made at San Diego, Cal., and the wireless telephone was employed in active service on the western front for some weeks before the armistice was signed.

Through a radio telephone installed on the south

portico of the White House, President Wilson on November 22 directed the maneuvers of half a dozen army airplanes flying over the Potomac river several miles away.

The planes in formation nose-dived several times and swung around a circle 1,500 to 2,000 feet above the ground. They were scarcely visible.

Several telephone receivers were connected to the switchboard and Mrs. Wilson and other members of the party were enabled to listen to the command as well as watch the execution. A single plane carrying a flight commander rose in the air first and flew up and down, dived and looped in accordance with the order telephoned from the ground. Then, following directions, the flight commander flew back to Bolling field and in response to orders called upon his squadron to maneuver.

The telephone was similar to the instruments used by American aviators in France, the secret of which was disclosed after the armistice was signed.

Important Swedish Telephone Merger

According to Consul General Albert Halstead, Stockholm, Sweden, the *Affärsvärlden*, a Swedish trade journal, for July 10, 1918, reports the consolidation of the Aktiebolaget L. M. Ericsson & Company and Stockholms Allmänna Telephone Company, stating:

The two Swedish telephone companies have been combined in order to meet expected competition and possible business extensions after the war. The Aktiebolaget L. M. Ericsson & Company mainly manufactures telephone instruments and materials, while the Stockholms Allmänna Telephone Company installs and maintains the wires. The latter company also has concessions for wires in other countries.

As competition sometimes arose between these two companies, a new company, Telefonbyggnads Aktiebolaget (Telephone Installments Company, Ltd.), was organized to take over both companies' interests in Russia. This company has installed a large number of telephone wires in Russia. The Russian government has taken over the wires in Russia without as yet granting compensation, the question still being under consideration. The telephone wires in Warsaw were in August, 1915, seized by the Germans, but the company expects to have them restored in good condition in the future. The temporary government of Poland has requested that the telephones may be used for traffic again.

Stockholm's Allmänna Telephone A. B. recently sold its wires with certain properties to the Government, but its factory will continue to manufacture materials for the Government for the next five years. It has also recently established a factory for manufacture of cables.

Aktiebolaget L. M. Ericsson & Co. employs about 1,500 men in Stockholm, 2,000 in England, America, and Austria-Hungary, and under normal conditions 3,000 in Russia. Besides telephone materials, it makes electric meters, magnetic spark plugs, etc. Its branch in Russia used to be a great enterprise, that country absorbing the plant's entire output. Its main competitors in Russia are the Germans.

The largest branch of the Ericsson Co. is in England, where it employs 1,000 persons, with a market in England and its colonies. However, its export trade is almost closed on account of England's consuming all its output. Its competitors in England are the Western Electric Co., some English firms, and the Siemens Bros. firm, which before the war was German.

Ericsson Co.'s branches in Vienna and Budapest manufacture mostly telephone instruments. The production has increased and is still growing. Business in Budapest is better than in Vienna. Employes in Vienna number 640 and in Budapest 460. The market is only domestic. There was competition with several Austrian firms and with the Western Electric Co. before the war.

Its branch in France is of recent origin and is much hampered on account of the shortage of labor. At present it employs 200 persons and has to meet competition from both French firms and the Western Electric Co. of America.

The Western Electric Co. is the Ericsson's largest competitor in the world market and the only one to be seriously considered. Next to the American competition comes the German, which, however, has been of any importance only in Russia.

The United States has had its most important business in Canada, Brazil, Cuba, and partly China; Germany has had Russia. The Swedish telephone industry has had a more even apportionment. Outside of the United States, Canada, Cuba, Japan, and Germany it has been successful everywhere. For example: In South Africa it has almost the monopoly; in Australia, fair market; in South America, markets in all the republics; in Mexico it has concessions on wires in the capital and competes successfully with the Americans; in Holland's colonies in India the market is almost exclusively Swedish; in China some of the market is Swedish; in British colonies in India it has a lately developed market; in Egypt, a considerable market; in Spain it offers a successful competition with the Germans; in France it possesses a considerable market; holds markets in the Balkan States, Switzerland, Holland, Belgium, Denmark, etc.; Germany has offered no market, however, for the Swedish telephone industry.

The telephone industry has a big field to be invaded. Should the number of telephones used in England, France, and Germany increase to the same number per 100 inhabitants as in Sweden; in Austria-Hungary, Russia, Spain, and Italy by half that number; and in such countries as Argentina, Brazil, Chile, and Japan by one-fourth, the total number of telephones needed would be about 8,000,000.

When Wire Is Priceless

Telephone wire is the principal weapon with which the Yanks combat the hardships of trench life in the devastated fields of once fair Flanders. By means of it the crude luxuries of trench life are obtained, so say those who have inhabited the cities made by hand, where live men, rats and cooties.

Newly occupied American trenches quickly take on the appearance of billboards we see in our cities. Posters of dancers, favorites of the music halls of "Blighty" and "Paree," the pictured images of society belles from American newspapers, and oil paintings collected from once beautiful homes—such are the ornaments with which the dugouts are adorned.

Telephone wire is the means by which these decorations are placed on the mud walls, the wire forming picture hooks more fantastic than artists ever before conceived.

Telephone wire also is a material used in making beds. Wire is drawn across the frames of bunks, with a sag in the middle. A thick covering of straw is then laid over the improvised springs, and on this "downy" couch, covered beneath a rough khaki overcoat, the Yank rests, undisturbed except by the ceaseless activities of the cootie.

Men who have been "over there" have said that frequently soldiers have stopped in their pursuit of the Hun to gather bits of telephone wire lying along the blood-soaked fields of No Man's Land. Still others have risked their lives to get bits of the wire. With characteristic American adaptability and ingenuity the Yanks have proved that invention truly is the daughter of necessity, and the fertile brain of the American soldier defies the horrors and discomforts of war.—*Southwestern Telephone News.*

"Why walk? Push the Button and Talk" is the title of a neat 12-page, envelope size booklet used by the Stromberg-Carlson Telephone Manufacturing Company to describe its intercommunicating telephone apparatus.

Platinum in Germany

In a lecture before the London School of Economics last year Mr. Johnstone, of the Imperial Institute Research Department, referred to platinum as one of the very few rare "key" metals that do not occur in considerable quantity in the British Empire. Several possible sources of supply by treating various Canadian by-products were, however, mentioned. According to "Metall und Erz," a process has been developed in Germany for obtaining platinum from a variety of ore at Wenden, 200,000 tons of which have been located. Tests so far conducted indicate that about 32 gr. of platinum per ton of ore can be recovered, and the process is said to be a comparatively easy one.

Brevities of the Business

The Activities of the Whole Telephone Field Told in Short Paragraphs

PERSONAL NOTES

Alfred Statley, manager of the local telephone exchange at Independence, Ore., died recently from pneumonia following influenza. Mr. Statley had been manager for two years. He was formerly in the employ of the Home Telephone Company in Portland. He is survived by his wife, who lives at Independence, and other relatives in St. Louis, Mo.

John O. Beam, who has been manager of the local office of the Bell Telephone Company at Warren, Pa., for the past year and a half, has been transferred to the managership of the same company's office in Erie. P. L. Schauble, former manager of the local office, will return to take the position vacated by Mr. Beam when Beam goes to the Erie office.

Following a brief illness, J. D. Gordon, division plant superintendent of the Chesapeake & Potomac Telephone Company (Bell system) of West Virginia, passed away recently in the family home at Woodsdale. Death was due to pneumonia. Mr. Gordon was a popular employee and a congenial and esteemed citizen. He was graduated from the University of Michigan, Ann Arbor, about ten years ago and for a few years was an instructor in that institution. He was born in Detroit, Mich., 36 years ago. He is survived by his parents in that city. He leaves besides his parents a wife and three small chilldren.

Samuel S. Algire, prominent citizen of Wolcottville, Indiana, and manager for many years of the Farmers' Telephone exchange in that city, died recently. Death was due to complications, the outcome of an accident in which Mr. Algire participated twenty-five years ago.

B. Durham has been elected manager of the telephone system at Junction City, Ark.

H. M. Richardson, who has been manager of the Home Telephone Company at Castle Rock, Wash., for the past two and a half years, has been transferred to Independence, Ore. Albert Spratley, a former manager at Castle Rock, who has been the company manager at Independence, died recently and Mr. Richardson will take his place there. Ernest Hawkins, who has been a lineman for the Northwestern Long Distance Telephone Company for several years, will succeed Mr. Richardson at Castle Rock. Mr. Hawkins' home was at Yacoit, Washington, but made Portland his headquarters.

James Ardery is superintendent of the Capron Home Telephone Company, Capron, Ill., George Olson having resigned. Mr. Olson has been superintendent since its organization.

Captain David Washburn, formerly wire chief at Douglas telephone exchange, is now in charge of telephone and telegraph equipment with the American forces in France. Captain Washburn is an Omaha man and received all of his telephone training here. He entered the service in July, 1917, and has been in France since last winter. He went to France as a second lieutenant but soon after his arrival overseas was made a first lieutenant. Recently he was promoted to the rank of captain and placed in charge of telephone and telegraph equipment with Pershing's army.

Walter Jones, late of Grand Island, is the new general manager of the Platte Valley Telephone Company at Gering, Neb., having taken the place of J. N. Wicks, who recently located at Riverton, Wyo.

L. H. Coon, local manager of the Citizens Telephone Company, at Newaygo, Mich., has resigned his position and will locate at Beloit.

Fred I. Gorham, former manager of the telephone company at Georgetown, Ky., who was at a cavalry training camp at New Mexico, died of pneumonia.

John Raymond Brohawn, district manager of the Chesapeake & Potomac Telephone Company, Central Maryland district, with headquarters at Baltimore, died at University Hospital, in that city, on October 8. His death was caused by pneumonia, following an attack of influenza. Mr. Brohawn was born on February 3, 1885, and entered the employ of the Telephone Company at Baltimore on March 4, 1907, as a salesman. After that, he held various clerical and sales jobs until 1910, when he was appointed chief clerk in the business office. Early in 1912 he was made cashier. On August 1, 1913, he was made sales manager for the city of Baltimore and district manager on July 1, 1915. On January 1, 1916, he was transferred to the Central district, in the same capacity. Mr. Brohawn was known in telephone circles and to many people in the city as Captain Brohawn, having served in the National Guard with the old Fourth and Fifth Maryland regiments, in which he rose from private to captain. He served on the Mexican border as captain from June to October in 1916 and when the National Guard was made part of the regular army in 1917 went to Camp McClellan with the regiment. On February 13, 1918, he was honorably discharged on account of physical disability and returned to his duties with the telephone company. He had many friends in the company and out of it and was known for his kind and pleasant disposition. Many of the men who worked with him joined the National Guard and were placed in the company commanded by him.

Glenn McGowan, superintendent of the Galesburg Union Telephone Company, Galesburg, Ill., passed away recently at his home, 525 Monroe street. He had been sick about two weeks and his sudden death was due to influenza. Glenn Raymond McGowan was the son of Mr. and Mrs. Frank McGowan, of Knoxville, and was born at that place March 28, 1882. He received his education in the grade schools and in Knoxville high school, graduating with the class of 1899. He was married November 22, 1905, to Geneva Peterson, at Galesburg, and to this union two children were born. For the past sixteen years he has been employed by the Galesburg Union Telephone Company and at the time of his death was superintendent.

The first publicly announced retirement from war service by a big business man since hostilities ceased came recently with the resignation of Walter S. Gifford, director of the Council of National Defense. He returns to the American Telephone & Telegraph Company as controller. His place on the council has not been filled, Secretary Grosvenor B. Clarkson assuming his duties.

Jack Hamilton has resigned his position as manager of the local telephone exchange Morral, Ohio, and with his wife and little son, Robert, left recently for Chillicothe, where they will make their future home. William Koontz has accepted the position made vacant by the resignation of Mr. Hamilton.

J. W. Paul, until October 5 manager of the Southern Bell Telephone Company at Eureka Springs, has moved to the Sunny South. He will engage in the banking business at Sumner, Miss. Mr. Paul was always prominent in civic affairs in Eureka Springs, and did much to build up the town to its present position as one of the leading Arkansas health resorts. He began his telephone career in the South, and has never been able to resist its attraction. Joining the Southern Bell Telephone Company at Brewton, Ala., as manager in 1905, he remained in Alabama for several years, before he accepted a position with the Government, having supervision of Government lines on the Tombigbee river. He returned to the Bell as manager at McGehee, where he worked until his transfer to Eureka Springs in 1916. L. T. Bradford, formerly employed at Van Buren, has succeeded Mr. Paul. Mr. Bradford has been a Bell man since October, 1906. He left the company in 1908, but returned in two years as a member of the Harrison plant department.

F. H. Kissling, who has been manager of the Central Union Telephone Company in Terre Haute, Ind., for seven years, has become general secretary and treasurer of the Mary Ann Mining Company, Joplin, Mo.

The concern, in which Mr. Kissling is interested, operates a large ore mill and two shafts. During the last year Mr. Kissling has been president of the board of directors of the Young Men's Christian Association. He will be succeeded in this office by Walter C. Ely. Mr. Kissling is an active member of the Liberty Guards. He has been associated with the Bell Telephone organization for fifteen years. I. N. Crawford, who has been Mr. Kissling's chief clerk for five years, will be in charge of the Terre Haute telephone business.

W. M. Swift, for the last five years manager of the office of the Southwestern Bell Telephone Company at Iola, Kas., recently was appointed manager of the Springfield exchange. Mr. Swift will succeed William G. Seath whose death occurred some time ago, following an attack of influenza. Mr. Swift is a former resident of Springfield. Eight years ago he had just completed a term of two years as a member of the Springfield police force. He entered the employment of the telephone company as chief clerk to R. G. Porter, district manager, when a change in the political management in the city resulted in a complete shifting of the police force.

Frank Shipps of Monticello, Ill., is moving to Weldon where he has taken over the managership of the Nation Telephone & Electric Company's plant at that place. Henry Diehl, formerly manager of the Weldon office has moved to Clinton and will be employed in the local office. Mrs. Frank Marshall of Clinton is at present in charge of the Weldon switchboard.

G. A. Harkness has been transferred from Blair to Alliance, Neb., as local manager for the Nebraska Telephone Company and Mr. Kline, of South Omaha, takes his place.

Announcement was made recently that Henry R. Pott, a former Allentown boy, who is at present chief clerk to the district manager of the Bell Telephone Company of Pennsylvania at Altoona, has been promoted to local manager of the Bell company at Lewistown. Mr. Pott entered the telephone field with the Bell company at Altoona on May 15, 1916, as a commercial representative and later was transferred as rights-of-way agent of the Altoona district and through his excellent efficiency and good work was promoted to chief clerk to district manager December 24, 1917.

William H. Donavan, assistant engineer, Chicago Telephone Company, died on October 8 from organic heart trouble. Mr. Donavan had been with the company for about seven years. He is survived by his widow, Mrs. Georgia Donavan.

Frederick W. Eaton, secretary and treasurer of the Pacific Telephone & Telegraph Company, at San Francisco, Cal., left a half million dollar estate at his death on November 5 of this year, according to the will filed for probate in the Superior Court recently. Eaton's death, which occurred at his home, 1940, Vallejo street, followed a brief illness. He was 73 years old and a pioneer resident of this city.

Ralph Carter, 42 years old, president of the Monroe County Telephone Company, died in Bloomington, Ind., of influenza and meningitis complications. Carter was formerly editor and publisher of the Smithville News. He is survived by the widow and four children.

Thousands of telephone plant men will be interested in the announcement of the death on September 28 of Mathias Klein, of Chicago, who passed away at the age of ninety-two years. In his death the electrical industry loses a pioneer in the development of tools for the lineman and electrical mechanic. In 1857 the little blacksmith shop of Mathias Klein was located within a short distance of what is now the heart of the Chicago loop district. From this humble beginning grew the tool business carried on for many years by the firm of Mathias Klein & Sons. Mr. Klein retained his active connection with the business until about three years ago when he was succeeded by his sons, who with his three daughters, twenty-two grandchildren and eight great-grandchildren survive him.

E. G. McCullan, local manager of the Bell Telephone Company at Crystal Lake, Ill., died on October 28. Before entering the service of the Chicago Telephone Company in August, 1910, Mr. McCullan was associated with the Nunda Electric Light & Telephone Company, operating in this territory.

Peter T. Dean, Jr., 47 years old, 1228 Morrill street, Mt. Adams, Ohio, head of the construction department of the Cincinnati and Suburban Bell Telephone Company, died of heart disease recently at his home. Mr. Dean was a son of Peter Dean, Sr., for many years a resident of Mt. Adams. He is survived by his widow, two sons, John and Edmund Dean, and a daughter, Mrs. Joseph B. Brauch.

President Spalding of the New England Telephone & Telegraph Company recently returned to his pre-war job as the head of the telephone organization in that section of the country, President Wilson having accepted his resignation as a colonel in the United States army. His return was as quiet as his departure, 13 months ago, when he slipped away to Washington, and within three days was on his way to France as a lieutenant-colonel in the aviation section of the signal corps, where his overseas work won for him a promotion to a colonelcy. With the announcement of the armistice, Col. Spalding felt that his services would be of more value to the telephone organization than to the army, and his superior officers accepted that viewpoint and indorsed his request that he be permitted to return to civil life. There was a lively interest at telephone headquarters when the news of his return had percolated through the various offices. Various department heads called to pay their respects, until these visits assumed the proportions of an informal reception. President Spalding complimented his associates and the employes under their direction for the splendid manner in which the country and the public had been served during the war period, and especially during the recent influenza epidemic.

F. L. Smiley, for the past four and one-half years manager of the Wisconsin Telephone Company exchange in Beloit, has been promoted to the Racine branch and will leave for that city as soon as his successor in Beloit has been named. He has already moved his family to Racine and expects that he will go in a very short time.

News has been received of the death in Nashville, Tenn., recently of E. E. Bawsel, general manager of the Cumberland Telephone & Telegraph Company, who was for many years a resident of Atlanta. Mr. Bawsel was stricken suddenly while at his desk, and every effort to revive him proved futile. He had been in ill-health, but was improving rapidly at the time of his death. He was identified with the Bell system for more than forty years, and was superintendent of the state of Georgia for the Southern Bell Company, with headquarters in Atlanta when promoted to general manager at Nashville. He was prominently identified with the social and business life in Atlanta. Besides his wife, he is survived by three sons and one daughter.

Chief Clerk C. N. Edwards is temporarily filling the office of general manager of the Cumberland Telephone & Telegraph Company at Nashville, Tenn., Vice E. W. Bawsel, deceased. It is expected that a successor to Mr. Bawsel will be chosen in about two weeks.

W. S. Corman, who has been manager of the Nicholas (Ky.) Home Telephone Company for several years, has been transferred to Maysville, and J. C. Head, of Lawrenceburg has succeeded him.

Mrs. Zeller, for four years manager of the local telephone exchange at Greeley, Colo., died recently of pneumonia. Mrs. Zeller was about 35 years of age, and a widow. She leaves one daughter, about 17 years old, to mourn her death.

NEWS FROM THE FIELD.

ALABAMA.

The city of Birmingham, by a decision handed down by the Alabama public service commission recently, lost its fight against the Southern Bell Telephone Company for reduced rates. The case has been before the commission since the fall of 1915, the city contending that the charges were exorbitant and excessive. Commissioner Gaillard dissented from the view of his colleagues, who held that the new revenues of the company were not excessive on the basis of rentals paid the American Telephone & Telegraph Company and valuation of the property in Birmingham.

A raise of 33½ per cent in telephone rates is asked by the Ozark Telephone Company in a petition filed with the Alabama Public Service Commission. Advanced cost of labor and material, it is indicated, is responsible for the request made upon the state board. The petition probably will be set for hearing at the regular meeting of the commission early in December.

ARKANSAS.

The first telephone line in the Mena manganese field is now in course of construction by the Enid Mining & Milling Company. General Manager Richard Messall stated Monday that he believed much time could be saved by having a private wire between the camp on Brushy Creek and Mena. Wire and other supplies have been ordered and construction work will be started as soon as possible. The line will follow the proposed new road over Smoke Rock Mountain. While Manager Messall plans the line to be a private wire, it is possible that he will permit the forest reserve system to connect with the mining company's line. The forest system formerly entered Mena by way of Shady, but recently the connecting line was cut off and the forest department had no connection with the county seat.

As a result of many complaints of inferior service by the Southwestern Telephone Company's exchange at Conway, the city council adopted a resolution providing for the appointment of a committee to investigate. Mayor G. W. Bruce appointed on the investigating committee Aldermen Hartje, Fred Gordy and J. I. McClurkin. The council last night elected Oscar Stone as night marshal to fill the vacancy occasioned by the death of John Long, Jr. A. J. Meadors was elected a member of the

Board of Improvement in Paving District No. 4, succeeding L. H. Pyle, removed.

CALIFORNIA.

That the city council would fight any attempt of the Southern California Telephone Company to have the state railroad commission rule against the use of the automatic telephone at Los Angeles was made evident recently by Councilman Conaway. The company has asked the railroad commission to review the telephone situation. Conaway said he suspected the company was trying to get a ruling in favor of the sole use of the Sunset telephone.

Representatives of the employees of the Pacific Telephone & Telegraph Company of the Pacific Coast met recently in the office of the Pacific District Council of Electrical Workers to draft amendments to the wage scale and working agreement between the company and the council. Suggested changes have been submitted by the various unions of the district which will be acted upon by the committee. The recommendations of the committee will be referred to the unions for referendum vote after the demands will be presented to the company.

Mayor F. T. Woodman recently requested Chief Engineer Franklin D. Howell of the Public Utilities Department to investigate the service being performed by the Southern California Telephone Company. The mayor said he had received a number of complaints against the service. He said that no time should be lost in having the very best possible service provided by the company.

Ventura will be the first town in Southern California to have the Pacific and Home telephone lines consolidated, according to the statement of officials of the Pacific company. February 1 has been set as the latest date for the consolidation, and promises are made that the work will probably be finished before that time. Sixteen towns in the southern part of the state are affected by the consolidation.

CANADA.

The Bell Telephone Company of Canada has made application to the legal authorities for an increase of 20 per cent in rates. The company also proposes to increase long-distance calls to a minimum of 10 cents for eight miles and 5 cents additional for each eight miles. Increased cost of operation is the reason given for the desired increased rates.

GEORGIA.

A merger between the Southern Bell Telephone & Telegraph Company and the Atlanta Telephone & Telegraph Company, by the sale of the telephone lines and properties of the local company to the larger concern, is sought in a petition submitted to the Atlanta city council recently.

ILLINOIS.

The Chicago Telephone Company asked the public utilites commission in Springfield for authority to increase exchange rates 30 per cent in Cook, Du Page, Grundy, Kane, Kendall, Lake, McHenry and Will counties. Chicago is excepted. President Sunny said increased operating expense makes the application necessary. He added: "Existing rates have been in force twelve or fifteen years, while cost of materials have risen 100 to 300 per cent. Wages have been increased 55 per cent in three years. We are in the same position as the gas company. We need more money to operate." Toll rates to Chicago will not be affected. All charges involved are flat rate—or unlimited service. Only 10 per cent of telephones here are so listed. The balance are nickel a day and measured service instruments. Under the proposed schedule single line business telephones in Oak Park would cost $62 a year instead of $48; two-party line rates, $48.80 instead of $36, and four-party lines, now $18, $19.20. Practically the same charges would be made in Evanston, Elgin and Aurora. The company's application for higher rates here is being considered by the department of public service.

The contractors expect to be able to turn over the new office of the Stark County Telephone Company now under course of construction, on or about December 1.

Charges that the Evanston Telephone Company is "profiteering" in charging $10 for each installation of an instrument were made recently to Alderman Charles B. Eiden. Frank Didier, 833 Madison street, the complainant, declared company officials had claimed the price was fixed by the government, even though the price was only $5 in Chicago. Alderman Eiden refused to say whether he would ask a council investigation.

Chicago Telephone Company reports July gross earnings $2,308,442, an increase of $536,830, and net after taxes $702,477, an increase of $544,134.

The Greenup Telephone Company has filed (jointly with the Illinois Independent Telephone Association) with the State Public Utilities Commission of Illinois an application for permission to increase the rates for service in Greenup and vicinity. This application asks permission to increase the rates of all classes of service 25c per month per telephone, with a further proviso that in case the present rental charge is paid on or before the 15th of the month, the increase of 25c applied for before the State Commission will be given as a discount, leaving the present rates the same if such payment is so made.

Commissioner Patrick J. Lucey, of the Illinois Public Utilities Commission, recently heard the petitions of the Mount Auburn Telephone Company and the Jerseyville Telephone Company for authority to increase their rates for Mount Auburn, Christian County, and Jerseyville, Jersey County.

If negotiations now under way are successful, the properties of the Inter-State Telephone Company at Springfield, Sterling, Peoria, Bloomington and in a number of northern Illinois cities will be taken over by the Central Union Telephone Company or the Chicago Telephone Company within the next few weeks. The plans have all been completed for the merger, it is said, and will be submitted to the government for approval within a week or two. While several attempts have been made to do away with the dual telephone system, it is only now that there has been much prospect of success.

The Chicago Telephone Company reports for September total operating revenue of $1,789,946, an increase of $3,016 over September, 1917; net operating revenue, $240,322, a decrease of $112,605.

The Mississippi Valley Telephone Company has filed with the State Public Utilities Commission, a petition, asking for a change in rates for business, residence and rural lines and switching stations, in Bowen and vicinity, Hancock County, Illinois. The said increase of rates involves an increase of all classes of service, and discontinue certain free service, which is now being given and received by said company at Bowen, and establishes a toll charge between the places named in the petition.

George P. Ramsey, secretary to Commissioner Patrick J. Lucey of the Illinois Public Utilities Commission, recently heard the complaint of the Assumption Mutual Telephone Company of Assumption, Christian County, against the Central Union Telephone Company for their refusal to enter into a contract for the exchange of service through their switchboards at Decatur, Pana, Taylorville and other points in Christian and Macon counties.

The Illinois Independent Telephone Association, composed of a large number of independent telephone companies of the state, has filed a petition with the state utility commission, asking for the right to increase its rates 25 cents a month for service.

INDIANA.

A complete agreement has been reached and a contract signed between the United States Telephone Administration and the officials of the Home Telephone & Telegraph Company, Fort Wayne, in regard to the operation and control of the lines of that company, following a conference between the representatives of both parties recently at Washington. Frank E. Bohn and O. Marahrens represented the company at Washington.

The United Telephone Company of Marion petitioned the commission for an increase in telephone rates, asking for a $3.50 monthly rate for business telephones—the present rate being $0.50—and an increase in residence telephones from $1.50 to $2.50. The schedule by the utility asks for a guaranty of 11⅓ cents a day for all coin collector telephones, the establishment of a two-party residence service at a $2 rate, but no increase for rural telephone services.

The city of Richmond and the Richmond Home Telephone Company filed a joint petition with the Public Service Commission recently asking for an increase in telephone rates as a war emergency. Recently the company asked for an increase, but this was opposed by the city. The petition asks that the business rate be raised from $39 to $42 a year and the residence rate from $21 to $24.

Glenwood is ambitious for a telephone exchange of her own but has had to wait because of government opposition to all extensions of facilities that would take money needed for war purposes. The Rushville Co-operative Telephone Company is ready to put in an exchange there and the State Public Service Commission would not, it is thought, oppose it. It is urged that Glenwood stands in much need of better telephone service as it can not be reached save through Falmouth and Orange exchanges.

The Public Service Commission in passing on the case of the College Corner (O.) Telephone Company recently established a precedent in Indiana by accepting a telephone company serving patrons in two states as an interstate utility and, therefore, under the jurisdiction of the Interstate Commission. The College Corner Company which is located near the Indiana state line and serves patrons in Indiana, petitioned for an increase in rates last spring. The petition was denied. The company then increased the rates on its own initiative and submitted a schedule to the Interstate Commission. In yesterday's order the Indiana commission upheld this action.

Ground was broken recently for the new telephone exchange building to be erected on Third street, on a vacant lot near the corner of Main in South Bend. The building is to cost $45,000. The Christman firm of South Bend is the contractor. The building is to be finished by April 1 next.

It will be three stories of red brick and Bedford stone, and will have a frontage of 66 feet and a depth of 72 feet. The first floor will contain the manager's and business office, girls' dining room and the plant apparatus, while the second will have the operating room and an operator's rest room. The lot was purchased from Charles A. Ostrom several months ago, but building operations were held up on account of the war. On its completion there will be but one telephone exchange in the city, the Bell and the Home being consolidated.

Several carloads of material for the Central Union Telephone Company have arrived which are to be used to commence work, both inside and outside of their exchange, to bring about the consolidation of the two exchanges in Kendallville. It is thought that work will commence very soon, and will take several months to complete.

Telephone installation and moving charges ordered recently by the postmaster general were automatically made a part of the rates of every telephone company in Indiana recently by an order of the Public Service Commission. There has been considerable confusion among telephone companies because of the Washington order, as under the laws of Indiana no telephone company can charge rates except those on file with the commission. As the federal order made the charges compulsory, the step was taken by the commission. The installation rates that now must be charged are $5 for telephones where the rate is less than $2, $10 if the rate is from $2 to $4 and $15 where the rate is more than $4 a month. The order also provides for the payment of the cost of labor and material for moving telephones.

The federal government may be forced to effect not only a consolidation, but a physical merger as well, of the two competing telephone companies of Indianapolis, as a result of their failure to reach a voluntary consolidation. Representatives of the competiting lines in conference with W. H. Lamar, of the legal staff of the Federal Director of Telephones and Telegraph, reaches no basis for a voluntary merger. The entire problem is complicated by the uncertainty of the length of time the government will control wire communications, now that the war is over. Enmity and rivalry between the two competiting companies are also responsible for failure of voluntary negotiations, in the opinion of officials.

Asking $1,000 damages, the Home Telephone Company, at Elkhart, recently brought suit against the Chicago, South Bend & Northern Indiana Railway Company, Hugo Winteroff and the Foster Traction Company, of that city. The telephone company asks the damages for losses sustained because of alleged carelessness on the part of the defendants. The damages were sustained on September 2 when Winteroff was moving a house on East Jackson street, here. At one place it was necessary to move the trolley wires of the Foster Traction Company and the C., S. B. & N. I. railroad and in moving them, the wires struck a telephone cable, burning out the latter.

The Southern Indiana Telephone Company, at Evansville, recently received a copy of a general order issued by Postmaster General Burleson, which prohibits, after December 1, hotels, apartment houses, clubs and similar establishments from charging guests higher rates for local calls than charged at public pay stations. Manager Hall said no place, to his knowledge, was making an excess charge, that the order applied to the larger cities. The managements of the McCurdy and Vendome hotels stated they charged only five cents for telephone calls by guests.

The petition of the German Telephone Company, at Decatur, to have the name of the company changed was granted in a finding rendered in circuit court recently by Judge W. H. Eichhorn and the petition was granted to have the company's name in the future the "Craigville Telephone Company."

IOWA.

H. G. Conger of Des Moines, representing the Iowa Telephone Company, appeared before the city council recently and served a notice that the telephone company will increase its rates $1 per month in business houses and 50 cents per month in residences. Increased cost of material and higher wages was the reason given. The matter was referred to the city attorney and a committee for investigation.

KANSAS.

The Kansas side of Kansas City knows nothing officially of the telephone merger between the Home and Bell Telephone Companies. Both companies have franchises there but not a word has been said to the city officials of the proposed merger. The citizens have been inquiring how the rates will be affected and other things concerning the merger, but from the companies or the representatives of the Missouri side municipality the officials on the Kansas side have heard nothing.

The Bell Telephone Company is still considering the erection of a new building to house the company's employees in Topeka, as they have been planning ever since the new officers were removed to that city about a year ago. It was said recently that the work on the contemplated structure might be started some time early in 1920. Officials said, however, that nothing definite had been decided upon and that so far as they knew, no developments towards work on the structure have taken place recently. It was thought, however, that in the event the company does build, the foundation will be substantial enough to support eleven or possibly twelve stories, the first three floors of which could be used to accommodate the local exchange, and the next three the general offices, which are now situated on the top floors of the Central National Bank building, at Seventh and Kansas avenue. It is likely that only six floors will be built at first, the company adding new stories from time to time as business warrants. The telephone company owns the property on Jackson street, immediately south of and adjacent to the present telephone office, between Eighth and Ninth streets, which affords a frontage of 175 feet, and is 150 feet deep, and this is no doubt where the new building would be erected when the time comes.

KENTUCKY.

Expert telephone linemen from Paris and Ripley are assisting the line force of the Maysville Telephone Company in making certain repairs to the telephone wires which cross the Ohio river at that point.

LOUISIANA.

Commissioner Leon I. Kahn received advices recently from W. T. Gentry, president of the Southern Bell Telephone & Telegraph Company that the proposed merger with the Shreveport Home Telephone Company may be consummated within a few days. According to the letter of Mr. Gentry, considerable progress has been made in the direction of the merging of the two interests within the past week, and with only a few details to be adjusted, it is expected that Shreveport will have a unified telephone system within a short time.

MICHIGAN.

Mayor Marx, Corporation Counsel Frazer and Richard I. Lawson left for Washington recently to appear before the postmaster general to argue against increased telephone rates in Detroit.

Announcement was made recently by C. E. Tarte, general manager of the Citizens Telephone Company, at Grand Rapids, that the company will ask the Michigan Railway Commission soon for authority to advance telephone rates $9 a year on residence telephones and $18 on business telephones. The present rate is $36 a year for business and $24 a year for residence telephones.

The long expected merger between the Union and Bell Telephone Company interests through the section of Alma will take effect January 1, according to William A. Bahlke, former director and attorney for the former company. Entire plans for the merger have been completed, and it is said that the two concerns have secured the full permission from the United States Department of Justice, the postoffice department and also from the state railroad commission.

Grand Rapids will investigate the need of the Citizens Telephone Company for a 50 per cent increase in rates and if it finds that such an increase is not needed will oppose the granting of such a raise, it was stated at the city hall. The matter will be brought to the commission's attention as soon as the company publishes its official notice that it has applied to the state railroad commission for an increase and the commission will be asked to send a delegation or the city attorney to Lansing to attend the hearing before the commission of the company's petition. If it is shown at the commission hearing that the company is asking for an increase because of loss of revenue from outside telephone exchanges the city will fight the increase. If the company is able to satisfy the city commission that it must have more money to operate its local exchange the city may not oppose it.

It will cost more to talk in Portland soon if a plan under contemplation by the Citizens Telephone Company is put into effect. Notice was given that on Tuesday, November 5, representatives of the company would go before the state railroad commission, at Lansing, and apply for an increase in rates on all business, residence and farm telephones connected with the Portland exchange. The increase has been made necessary on account of the increased expense of operation and maintenance and under these conditions the railroad commission is pretty apt to grant the company's request. Under the schedule of rates proposed business telephones now renting for $20 per year will be increased to $24, residence telephones from $12 to $18, rural business telephones from $15 to $21 and rural residence telephones from $15 to $17. Further increases will be made on all farm telephones situated more than six miles from the central exchange. The rate for schools, churches, charitable institutions, etc., will remain the same under the proposed schedule of prices, but all telephones in lodge halls, clubs, etc., will be increased from $12 to $18 per year. Where desk telephones are installed in residences or on

rural lines an additional charge of $2 per year will be made.

Action on the application of the Citizens Telephone Company of Grand Rapids for an increase in rates in practically all of its western Michigan exchanges has been deferred by the state railroad commission until December 3. C. B. Tarte, general manager of the Citizens Telephone Company of Grand Rapids, was of the opinion the application for an increase, which in some instances amounts to nearly 100 per cent, would be tried on the entire system, but he was advised by the commission that each community would be heard separately beginning with the city of Grand Rapids. Tarte was uncertain whether he would be able to proceed by December 3 and it is quite likely the hearing will be postponed from that date. Allegan, Belding, Cadillac and Grand Rapids had representatives at the conference recently.

MINNESOTA.

Telephone rates in St. Paul soon will take a decided jump, according to recent reports. The increase, it is reported, will amount to 25 per cent. C. B. Hall, assistant to President G. W. Robinson of the Tri-State Telephone Company, said an announcement would be made shortly by the company. He declined to say whether the announcement would be on rumored rate increases.

No increase in telephone rates is contemplated for Minneapolis for the near future, according to L. H. Merrill, general manager of the Northwestern Telephone Company. Reports that an increase of 25 per cent was about to be instituted in St. Paul by the Tri-State Telephone Company were scouted by local telephone officials, who declared that the raise, if any, would be general throughout the country, since the telephone service now is under federal control.

Disclaiming any disposition to interferences with the regular and orderly work of the Minnesota railroad and warehouse commission, the Federal telephone and telegraph administration recently withdrew its request for suspension of the commission's valuation inquiry to furnish a basis for determining the reasonableness of long distance telephone rates in Minnesota. J. C. Koons, acting postmaster general, said as long as the work is well advanced it could be continued and was approved by the department, adding that there is no intention of interfering unduly with the state board. The request for suspension of the work was first made by the telephone companies on the ground that they had no funds to make a duplicate checking. After the government assumed control, Postmaster General Burleson renewed the request. Commissioner Fred E. Putnam answered that the work being done at the direction of the state Senate, was too far advanced to permit suspension at this time, and approval of its continuance resulted. The commission previously arranged to resume the inquiry after a slight interruption on account of lack of expert help.

Resumption of field work in St. Paul and Ramsey county by state telephone valuation crews was announced recently by D. F. Jurgensen, chief engineer of the state railroad and warehouse commission. This body was directed by the last legislature to appraise the value of telephone lines in Minnesota. The records will be used in adjusting complaints that long distance rates in many instances are unreasonable. Similar field work has begun in Hennepin County.

Officials of the railroad and warehouse commission said recently that telephone companies operating in Minnesota would file schedules showing definite rate increases proposed to raise additional revenue with which to meet increased wages and other operating expenses. The schedules were made public in advance of the hearing set for November 26. Practically normal service has been restored in Minneapolis with the exception of the East exchange, officials of the Northwestern Telephone company said. There was a marked improvement in the service in St. Paul, according to G. W. Robinson, president of the Tri-State Telephone Company.

MISSOURI.

The steps taken towards the merger of the Home and Bell Telephone Companies at Kansas City were discussed recently by John C. Koons, first assistant postmaster general, and A. F. Adams, president of the Kansas City Home Telephone Company. Mr. Koons was told satisfactory progress was being made in the plans to unite the two companies. He urged that the legal tangles surrounding the merger be settled as speedily as possible. Mr. Koons is a member of the government postoffice committee which has supervision over the telephone and telegraph companies of the country. He was accompanied here by Newcomb Carlton, president of the Western Union Telegraph Company, who had business here with his company. Mr. Adams said he could not say when the merger would be completed.

MONTANA.

Hardin is to have an entirely new telephone plant. It has been able to secure the material because all of it was ordered last year before the war put an embargo on such outputs, and the community feels that it is lucky. Every foot of wire and old poles, etc., will be removed from the streets, and new construction placed in the alleys. All subscribers will be placed on a metallic basis, with new central office equipment, will give Hardin a first-class telephone system, the old present system being obsolete and defective. Gerald Lansing, local manager, announces that all necessary equipment is on hand for the new work and as rapidly as possible it will be erected and placed in service.

The work of completing the telephone line from Lewistown into Winnett, abandoned last summer because of the shortage of labor, has just been resumed by the Mountain States Company and it will be finished in short order. The Winnett exchange will be installed in a couple of weeks or so.

NEBRASKA.

The Nebraska Telephone Company has petitioned the state railway commission for a 20 per cent increase in all telephone rates in their territory, which includes all territory in Nebraska north of the Platte river, excepting a few local companies. The proposed increase, if granted, will apply to both local and toll charges.

An Omaha law firm has applied to the state railway commission on behalf of the Wyoming & Nebraska Telephone Company, with headquarters at Chadron, for a 25 per cent increase of exchange and toll rates. The company operates in ten towns in northwestern Nebraska and intervening territory. Its exchanges in this state are located at Chadron, Crawford, Gordon, Harrison, Cody, Belmont, Valentine, Crookston, Whitney and Rushville. All three members of the railway commission are absent on a trip to Washington to confer with federal officials about getting the installation charges for telephones modified. A hearing may be held on the application of the Wyoming & Nebraska Company soon after they return.

An application by the Kenesaw Telephone Company for an increase of 50 cents in its business rate and 25 cents on residence and farm line telephones was heard by the railway commission recently. President A. S. Howard and Vice President S. A. Westing of the company presented it. The rates asked for are $2.50 on business and $1.50 on other telephones. The company also desires to abandon a $3 combination rate where the subscriber has a residence and a business phone. It asks permission to collect 25 cents additional where the service is not paid for by the 10th of the month. The same company has another request pending for the approval of a $7,000 stock issue to pay officers for their services in the past, where they drew no salaries.

Hearing on the petition of the Dodge County Farmers Telephone Company at Fremont for an increase of rental rates from $1.25 to $1.50 a month was held at Cribner before Railway Commissioner Victor Wilson of Lincoln.

The Auburn Telephone Company and the Pawnee Telephone Company at Lincoln have asked the railway commission for authority to raise their toll rates in the same ratio as the Lincoln Telephone & Telegraph Company has done, on messages handled over a combination route with that corporation. They also want to increase their own toll rates for short distances 25 per cent.

The Julian Telephone Company at Auburn has filed a request with the Railway Commission asking for a higher rate for telephone service.

NEW YORK.

An investigation of complaints regarding telephone rates in hotels and apartment houses in New York city will be made at once by the Public Service Commission. The announcement followed a conferenece at Washington between the commission chairman and Postmaster General Burleson and the committee in charge of telephone and telegraph operations. The commissioner was informed that the committee would be pleased to have the commission investigate the New York city complaints and that there was little doubt the commission's findings would be approved by the postmaster general.

The New York Telephone Company at Buffalo has announced that telephone subscribers, whose contracts at the old rates expired August 1 and who have not signed new contracts covering their service, have been granted an extension of time until December 2. Previously it had been announced that unless contracts were made November 1 service would be discontinued. This decision, announced by C. Arthur Spaulding, division commercial manager, gives subscribers a month's grace. The decision to do so was reached, Mr. Spaulding said, to make allowance for the conditions which have obtained in Buffalo during the past few weeks.

The merging of the Bell telephone system with that of the Federal Telephone & Telegraph Company, which was legally made several weeks since, is now being completed by a force of workmen in Cohocton. The Bell cable will be removed from the east side of North Main street to the west side and connected with that of the Federal system, and a cable will be run from the Federal central in the Bender building to

the Bell central at Henry Glover's in North Main street. The two offices have been maintained within a few rods of each other, though no other connection between the two systems was allowed and the patrons of both lines will greatly appreciate the change as the switchboard and all the office equipment will be eventually moved from the Federal office to the present Bell office on North Main street.

NORTH DAKOTA.

Telephones not absolutely essential to the conduct of the city's business at Fargo will be dispensed with, and telephones of city employees which are furnished at a discount of 50 per cent, but not used entirely for city use will be taken from the city hall at the request of W. L. Albright, commercial manager of the Northwestern Telephone Company, who appeared before the city commission and stated that the step was necessary under government control. Alex. Stern, president, and J. J. Jordan, finance commissioner, will make a survey and report at the next meeting. Under the franchise, the city is to receive three telephones without charge, and necessary telephones for employees at half rate.

Application will be made soon in North Dakota for increases in telephone rates, W. I. Albright, commercial manager of the Bell interests in Fargo, announced recently.

OHIO.

The system of dispatching trains on the Hocking Valley by telephone is now in successful operation between Columbus and Marion. The wiring is completed as far as Upper Sandusky and telephones are being installed. It is expected to have the line to Toledo in operation before the first of the year.

The Ohio State Telephone Company recently asked the state public utilities commission to allow an extension of three years on bonds issued by the Cuyahoga County Telephone Company and the United States Company, for $2,676,000 and $2,156,000, respectively, and which were issued to mature January 1, 1919. The company also asks that the interest rates be changed from five to seven per cent. The Ohio State Telephone Company absorbed the two companies named.

Increased rates, effective November 1, for the Citizens Telephone Company of Kentucky and the Cincinnati and Suburban Telephone Company were approved by Postmaster General Burleson. The Cincinnati rates, to which those of the Kentucky company were permitted to conform, previously had been approved by the Ohio state utilities commission.

Three hundred telephone operators in the employ of the Central Union Telephone Company are the beneficiaries of an advance in wages granted by the company. Notices were issued to holders of residence telephones of another increase of 25 per cent per month, beginning November 1.

Good news came to the operators in the employ of the Cincinnati and Suburban Bell Telephone Company recently in the form of an announcement that beginning with November 1, each operator in the employ of the company for more than one month would receive a substantial increase in salary. The increase to a certain extent is based upon the length of service with the company.

A year ago the automatic telephone system was put in operation in Lorain. The Black River Telephone Company has, since that time, added 400 telephones to its list. The service is generally accepted as being first class, prompt and convenient. Visitors here frequently remark on the speed with which calls are put through.

Galion Telephone Company, Galion, has increased its capital stock from $125,000 to $150,000.

To provide room for the extension of the dispatching department of the Big Four at Springfield linemen are installing insulated wire in the hallway at the east end of the passenger station with connections in the two rooms at the northeast corner of the building. The telephone switchboard operator will be moved from the dispatcher's office to a new room, which is being installed in the hallway. This will give additional space for the telegraph and telephone switchboards in the train dispatchers' department. Another room is to be created in the hallway for Stanley Mahr, secretary to the trainmaster of the Cincinnati division and for Miss Gretta Doorely, secretary to J. J. Stapp, road foreman of engines. E. M. Kelly, assistant superintendent, will occupy the present east room, which has heretofore been used by the trainmaster. The present quarters of Mr. Mahr and Miss Doorley will be used by the trainmaster and his assistant.

The Central Union Telephone Company at Columbus recently reported to police the theft of 3,525 pounds of copper wire from its warehouse, 35 N. Water street. The wire is valued at $1,000.

Bell telephone may soon bid adieu to the city hall in Columbus. It was evident at the committee session of city council recently that a vigorous retrenchment policy may be inaugurated for 1919 since the people failed to approve the one mill extra tax levy at the election. In view of the proposed increase in rates, it was suggested that Bell telephones can be eliminated.

The city has officially protested against a proposed increase in rates to domestic subscribers of the Central Union Telephone Company. Council recently declared the increases proposed under schedules filed with the Public Utilities Commission as unjust and unreasonable. The law director was authorized to represent the city at anticipated hearings in Columbus.

Perry County Telephone Company, New Lexington, has increased its capital stock from $75,000 to $125,000.

Directors of the Ohio State Telephone Company, at Columbus, in session recently, considered the issuance of $1,300,000 of notes to take up floating indebtedness. No announcement was made as to final decision.

The North Side Improvement Association, at Columbus, launched a movement recently looking toward the use of a single telephone system, the automatic, among the business men of Columbus. The movement is intended as an effective protest against the increased rates imposed on business telephones by the Bell company, effective December 1. At the meeting of the association, held at 1040 North High street, resolutions prepared by R. F. Williams were adopted, directing attention to the action of the federal government in taking over control of the various telephone systems, thus doing away with competition and holding that excuse for using more than one telephone system no longer exists.

The Ohio State Telephone Company recently asked the state public utilities commission for authority to extend for three years the underlying $4,832,000 bonds of the Cuyahoga Telephone Company and the Ohio State Telephone Company which mature January 1, next. Authority also was asked to increase the interest rate from 5 to 7 per cent.

The great volume of traffic over the telephones of Lorain during last month indicates that the automatic system was put into effect in the nick of time. It would have hardly been possible to handle the great number of calls with the old system. In October there were 1,029,968 calls over the system. The average calls for a day were 33,224. The average calls per line for a day were 18.3. The average calls per day 7.2. The heaviest traffic was on October 26 when there were 48,110 calls. On October 5, a close second, there were 39,213 calls and on October 13, the quietest day, there were 18,893 calls. The previous high record for a day was 39,000 calls.

The Chesapeake & Potomac Telephone Company at Bridgeport has a large force of men engaged in construction work on the county road. It is the intention of the company to extend its lines along High Ridge and thence to the main cable at the pike intersection. It will require several months labor to complete the work, but the line when completed will be of great convenience to the rural residents along the highway.

The Home Telephone Company directors at Ironton held a meeting recently at their rooms in the Citizens National Bank building to discuss the bond issue of $16,000 recently authorized by the state utilities commission, and it was decided to go ahead with the plans. The bonds are to be issued in re-imbursement for improvements made to the local plant. Those present were J. F. Druckemiller, F. W. Carey and W. C. Crater, of Columbus; Col. H. A. Marting, D. C. Davies, F. McCauley and F. J. Horschel, local directors; S. W. Boothe, secretary, and L. J. Gehrling, general manager.

OREGON.

The service of the Pacific Telephone & Telegraph Company has been discontinued at the town of Brooks, Marion County, according to information filed by the company at the office of the public service commission.

City Attorney O. H. Foster, acting upon instructions from the council, is making an investigation into the legal right of the Pacific Telephone and Telegraph Company arbitrarily to raise the telephone rates in Eugene, and will make an announcement to the people of the city in a short while. The claim is made that the company is not acting on behalf of the government, but upon the volition of the officials who feel that more revenue is needed for operating expenses. The general opinion is that the proposed rates, effective November 15, are unjust and not warranted by the conditions.

The local telephone system at Lakeview has changed hands, E. C. Thruston selling to J. H. and H. H. Hessig, of Klamath county. The deal includes not only the local system but the New Pine Creek line as well. It is also understood that an option has been taken on the Bly line. The new owners have a large system in Klamath county and also Siskyou county, Cal., and are experts in the business. It is expected that a great improvement will be made in the local exchange at an early date. The new owners took possession November 1.

A new automatic telephone system is being installed at the plant of the Williamette Iron & Steel Works, Portland, with 60 branches extending over the plant.

Employees of the Pacific Telegraph & Telephone Company, at Portland, are to be given wage increases effective from October 16. A bulletin conveying only this information was posted in the telephone company's main office. Officials said that wage advances are to come as a result of the conferences held in San Francisco. Beyond the fact that they are to be put into effect as of October 16 the local representatives assert they are in ignorance as to details of the increases.

Investigation of telephone service conditions in Portland was begun by the public service commission.

H. A. Corey, Oregon Public Service Commissioner, believes that the Pacific Telephone & Telegraph Company will increase revenue from the charge which has been fixed for installing telephones on new orders for service to meet the higher wage scale for operators, with a balance besides. "It may not be generally known to the users of telephones that from 25 to 40 per cent of the number of instruments in use are discontinued each year and the number replaced by new orders under the practices of the telephone company's regulation will mean a very substantial increase in telephone rates. If the citizen ordering a telephone installed is obliged to pay $5, $10 or $15 to get the service installed, that is certainly equivalent to an increase of just that amount in the telephone rate for the first year of service. It would not be in the least surprising if the income derived from this source in Oregon, on the announced rates, would amount to $200,000 the first year it is in effect. That increase in earnings would be of material importance in enabling the company to pay the higher scale of wages proposed for operators."

PENNSYLVANIA.

The Bell Telephone Company at Philadelphia has filed an application with the Public Service Commission to increase rates as required by the Federal authorities without the usual thirty days' notice. The matter was considered at the executive session in Harrisburg recently. It is estimated that the application, among other things, has to do with charges for installations of telephones.

SOUTH DAKOTA.

Articles of incorporation have been filed for the Union Telephone company at White Lake, with a capital of $2,500. Incorporators, C. H. Glissendorf, J. G. Dunn, Claude Glissendorf.

Articles of incorporation have been filed for the Arpan Telephone Company, Ar-Pan. Incorporators, A. L. Gurwell, W. T. Kennedy, F. A. Stoughton.

The Gas Belt telephone line from Okobojo to Pierre has recently been divided into two branches, a large number of new subscribers having been added on both divisions. The phones in the neighborhood of the location of the old Fiedler postoffice have been cut off from the Okobojo line, leaving only those directly north of Pierre on the line conecting Pierre, Okobojo and points farther north.

TEXAS.

Following a conference between city officials and J. C. Casler, president of the Dallas Automatic Telephone Company, before that concern was consolidated with the Southwestern Company, it was announced that an adjustment had been granted on the city taxes assessed against the automatic company. According to Commissioner Doran the automatic company was required to pay 4 per cent gross receipts tax and as this was acknowledged to be equivalent to a franchise tax the company was granted an adjustment because the tax was in excess of the rate paid by the Southwesern company.

A. J. Tyner of Corsicana has bought the Roane telephone line from Fount Martin and is getting ready to take charge.

VIRGINIA.

The long dreamed of connection between the C. & P. Telephone Company of Virginia and the Augusta County Farmers' Mutual Telephone Company, may become a reality, for a few days or longer at this time, if terms agreeable to both parties can be arrived at in the negotiations now pending. This step, which is an emergency measure, if it comes to pass, will be the result of local health officials petitioning the State Corporation Commission for connection, in order better to handle the influenza situation, both in the county and city. It is clearly understood that this action will in no way prejudice the outcome of the case of the two companies, now pending before the Commission.

Protests are being made against a charge of $10 for moving telephone stations from one place to another in Norfolk. This charge, it is claimed, is excessive, and the matter will be taken up with the Virginia representatives in congress. It is claimed that this charge is an excessive advance over that made before the war or in normal times, and involves a degree of profiteering in which the government seems to be a party. It is said the normal charge for moving a telephone was never more than $3.

WASHINGTON.

The member of the state public service commission who wrote to the postmaster general as federal manager of the telephones, at Washington and prejudiced Spokane in its efforts to secure justice in the rate controversy with the Home Telephone Company is strongly censured in a resolution to be considered by the city council this morning. The resolution is to be forwarded to Governor Lister with a request that action be taken. The public service commission has been called upon by the federal telephone administration to fix rates for Spokane. The city council feels that with a member of this commission already prejudiced against Spokane this city does not stand a chance to get a square deal. The telephone controversy came before the city council yesterday through the receipt of a letter from Senator Jones at Washington in reply to resolutions adopted by the city council. Senator Jones submitted a copy of a letter from Solicitor General Lamar of the postoffice department taking an adverse view of Spokane's telephone case and making the statement that a member of the public service commission of Washington had informed him that telephone rates in Spokane were already lower than in most cities of its size. Mayor Fassett and Corporation Counsel Geraghty were asked to prepare a resolution to the governor.

The Milwaukee Railway company has a force of men engaged in the construction of a telephone line from their local office at Deming to the Bellingham head office. At present all business of the company at this point is conducted over the lines of the Farmers' Mutual Telephone Company.

WEST VIRGINIA.

The Cottageville, Baden and Pt. Pleasant Telephone Company has made formal application to the state public service commission to increase the rates charged by the patrons of that company. The people affected are of Jackson and Mason counties.

WISCONSIN.

A $15,000 addition to the LaCrosse Telephone Company's exchange building at Fifth and Jay streets will be constructed immediately to provide room required for long distance facilities. Under non-war construction license No. 891 issued on November 6 by chief of the non-war construction section, priorities division of the war industries board, D. R. McLennon of Washington, Contractors Peter Nelson and Son who constructed the telephone building in 1911 will at once commence the excavation for an addition to the present building 15x60 feet, on the south side. Increased long distance facilities make it necessary to operate the long distance lines on the second floor adjacent to the local operating room, and more space will be necessary. The abolishment of collectors and the payments at the office require more office space. The addition will be two stories with basement to conform to the present building in appearance and will cost approximately $15,000. Weather permitting, work will be continued until completion. Extensive changes will be made in the arrangement of the main building so the new rooms in the addition will be most usable in connection with the former building.

E. R. Cooper left Clintonville recently for Mattoon to take over and manage the telephone system he recently purchased. The line was purchased from A. J. White who has owned and operated it for some time. At present there are about 200 telephones in use but Mr. Cooper expects if material can be procured, to add a large number as soon as the work of installing can be done.

The New Union Telephone Company of Dodgerville has filed an application with the commission for authority to increase its rates for service and that a hearing will be held in the city of Madison on the 6th day of December, 1918. The rates asked are as follows: Business, 1 party, $2.25 per mo., gross. Business, 2 party, $2.25 per mo., gross. Residence, 1 party, $1.75 per mo., gross. Residence, 2 party, $1.50 per mo., gross. Desk telephones, 25c per month additional. Business and residence, 2 party, $1.75 per month. Rural—grounded lines, $4.50 per quarter. Metallic lines—$5.25 per quarter. Switched telephones, 50c per quarter month. Above rates payable in advance, to be discounted 25c per month if paid before the 15th. The rates asked for amount to an increase of about 28 per cent for business telephones to 75 per cent for residence telephones.

WYOMING.

The Big Horn Telephone Company at Deaver has been sold to a local company and the Deaver line is included in the sale.

The new telephone building, a modern four-room affair at Mountain View, is nearly completed. It contains living rooms for the operator as well as the office.

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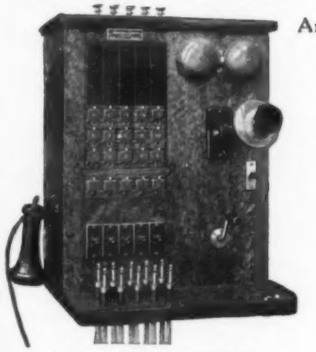

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Best Wishes for the New Year Kellogg

Why Our No. 105 Switchboard

No. 105-A 50 Line Switchboard. Also carried in stock with 100 and 150 lines equipped.

The equipment of each line in our new No. 105 Switchboard is one of our improved No. 11 Plug-Restoring Drops, a type which we have furnished in our switchboards for a number of years. The superior features of this line equipment are:

1. The line drop and jack are mechanically interlinked so that the insertion of a plug in the jack restores the fallen drop shutter to its normal position. Reduces number of motions the operator has to make in answering calls.

2. No. 11 Plug-Restoring Drops may be added to or removed from the switchboard, one at a time or in strips of five, without disturbing other drops or their wiring, and without use of a soldering copper.

3. Drop coils may be removed and replaced from the rear of the switchboard without the use of the soldering copper.

4. Each drop is fitted with separate contacts for a continuous ringing night alarm bell and for a code ringing buzzer. The night alarm contacts cannot be injured and disabled by careless operating because they are inside of the cabinet.

5. Rattler on drop armature gives clear code signal and assists the operator in distinguishing calls for other parties on same line from calls for switchboard.

6. Double cut-off type jack with long, heavy contact springs, retains adjustment permanently and gives a clear line free from drop connections when lines are connected together.

7. Heavy steel drop mounting strips provide a rigid support for drops and prevent loss of adjustment or false operation of signals due to vibrations.

8. Drop shutters in operated position show one curved and two flat white surfaces against a dull background. The signal can be seen by the operator from any angle in front of the switchboard.

9. Insulations between springs of jack and between frame of drop and the drop mounting are made of D. M. F. material which is a better insulation than hard rubber, and which will neither soften, warp nor crack when subject to temperature changes.

Gives Better Service At Least Cost

Highest Transmission Efficiency

The cord circuit used has the highest transmission efficiency of any local battery switchboard circuit containing similar operating features ever offered to the telephone industry. The transmission loss measured from answering plug to calling plug of a cord pair is less than 1 2/10 miles of standard cable, whereas in other circuits designed to accomplish the same ends the losses range from 4 to 7 miles of standard cable. Much of this high efficiency is made possible by the use of our No. 13-A Repeating Coil which is more efficient than any "talk-through, non-ring-through" type of repeating coil heretofore manufactured either by ourselves or other manufacturers.

Absolutely Non-Ring-Through

A subscribed on one of the connected lines cannot ring through the cord circuit and operate the bells on the connected line. This is because the No. 13-A Repeating Coil is a "talk-through non-ring-through" type repeating coil especially constructed, so that it will not transform enough of the ringing current to operate the bells of telephones on a connected line.

Positive Ring-Off

Whenever either or both of two connected subscribers "ring-off" after finishing a conversation, the clearing-out signals associated with the cord pair used operate positively, regardless of the lengths or types of lines connected. The drops operate independently of each other every time under all operating conditions.

All interior parts are in plain sight and are thoroughly accessible.

Double Supervision

The two separate clearing-out signals inform the operator of the exact condition of the connection at all times. As the signals operate independently of each other she knows when one of the two subscribers has hung up and rung off and the other is waiting, or when both have finished and should be disconnected.

This excellent operating feature prevents the annoying "tie-ups" that frequently occur when only one clearing-out signal is used and gives the operator the supervision over connections equal to that provided in large city switchboards.

Zero-Loss Cord Circuits

The first two cord circuits on the left side of the key-shelf are provided with repeating coil switching keys, which are used only when an extremely high-efficiency connection is required, as when a subscriber is talking over a long-distance line in which there are unusually large losses in other exchanges.

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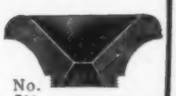

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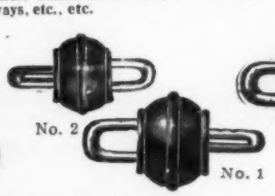

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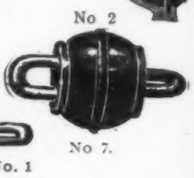

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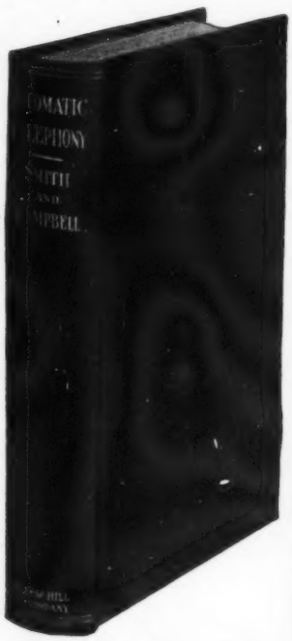

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Wire, Copper.
American Steel & Wire Co.
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Roebling's Sons Co., John A.
Standard Underground Cable Co.

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Wire, Galvanized Iron.
American Steel & Wire Co.
Indiana Steel & Wire Co.
Roebling's Sons Co., John A.

Wire Rods.
American Steel & Wire Co.
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Wire Rope Fittings.
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Wire, Rubber Covered.
American Steel & Wire Co.
New York Insulated Wire Co.
Roebling's Sons Co., John A.
Simplex Wire & Cable Co.
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Wire, Strand.
American Steel & Wire Co.
Indiana Steel & Wire Co.
Roebling's Sons Co., John A.
Standard Underground Cable Co.

Wire, Weatherproof.
American Steel & Wire Co.
Electric Cable Co.
Indiana Rbr. & Ins. Wire Co.
National Conduit & Cable Co.
New York Insulated Wire Co.
Roebling's Sons Co., John A.
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Standard Underground Cable Co.

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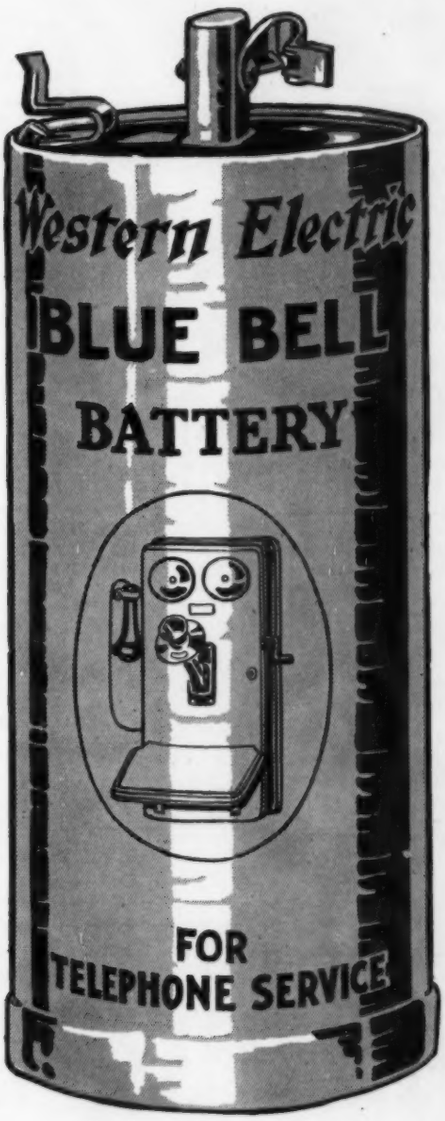

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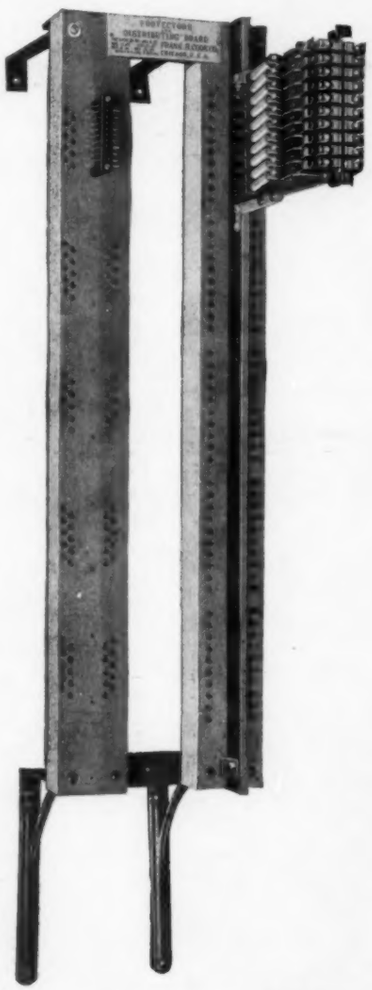

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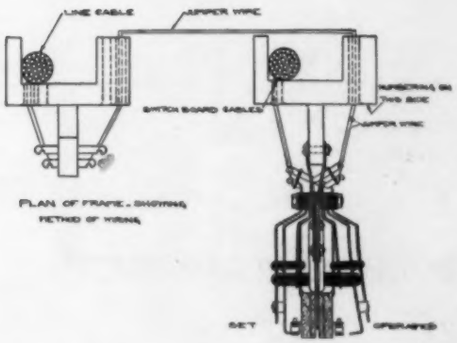

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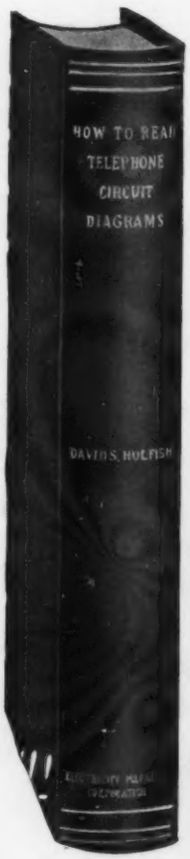
I have just finished my first reading of "How to Read Telephone Circuit Diagrams," by Mr. Hulfish. It is a good work. The author is to be congratulated on having done a new and useful thing in a thorough way. Let us hope the book may get into the hands of every student of telephone matters.—*Samuel G. McMeen.*



The non-electrical man or one unaccustomed to deal with diagrams outlining complicated electrical circuits is often stampeded in the presence of an involved blueprint by a kind of stage fright which is wholly disproportionate to the real difficulty in understanding the message of the draftsman. Mr. Hulfish's book seeks to withdraw this sense of confusion by explaining the simple elements out of which the complicated network of the blueprints may be built. Incidentally, much of the current practice of subscribers', line and switchboard circuits is developed in the explanatory illustrations. The subject of wiring diagrams, intended to show mechanical details for the aid of the installer, is treated separately from that of simplified circuits, in which the electrical action alone is shown. In the explanatory text material accompanying the diagrams much that is obvious is included in the descriptions, but the purpose of the book is doubtless accomplished if it succeeds in robbing the average telephone diagram of some of its fancied terrors of intricate detail. One without experience in diagram reading will certainly find the careful perusal of this book a highly profitable undertaking if he has the patience to follow through its pages.—*Electrical World.*

This book explains in a simple and concise manner how to read circuits from blueprints, etc. It comprises twenty-seven lessons, each a complete unit and devoted to the various apparatus which goes to make up a telephone system. The book contains a large number of typical telephone circuits, which are fully explained and directions given how to trace all currents. Practically all symbols encountered in telephone diagrams are explained. The text is written in non-technical language to as large an extent as possible, and should be a great help to those desiring to learn how to read circuit diagrams.—*Electrical Review and Western Electrician.*

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